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US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEYS DOCKET NUMBER
P01,0299

U.S.APPLICATION NO. (if known, see 37 CFR 1.5)
09/936460

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/02311	15 March 2000	15 March 1999

TITLE OF INVENTION
"METHOD, COMPUTER PROGRAMME PRODUCT AND SYSTEM FOR TRANSMITTING COMPUTER DATA TO AN OUTPUTTING DEVICE"

APPLICANT(S) FOR DO/EO/US
Hartwig SCHWIER and Juergen GREBNER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).)

10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C.371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report)**.

12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
    (SEE ATTACHED ENVELOPE)

13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification & marked up version of application.

15. ☐ A change of power of attorney and/or address letter.

16. ☒ Other items or information:
    a. ☒ Submittal of Drawings
    b. ☒ **EXPRESS MAIL #EL 843743268US, dated September 13, 2001.**

518 Rec'd PCT/PTO 13 SEP 2001

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/936460	PCT/EP00/02311	P01,0299

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO $860.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) $700.00		
No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) $770.00		
Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO $1040.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... $ 96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	23 - 20 =	3	X $ 18.00	$ 54.00	
Independent Claims	4 - 3 =	1	X $ 80.00	$ 80.00	
Multiple Dependent Claims			$270.00 +	$	
TOTAL OF ABOVE CALCULATIONS =				$ 994.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)				$	
SUBTOTAL =				$ 994.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$ 994.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +					
TOTAL FEES ENCLOSED =				$ 994.00	
				Amount to be refunded	$
				charged	$

a. ☒ A check in the amount of $ 994.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **501519**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

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31,870
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IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

"**PRELIMINARY AMENDMENT**"

APPLICANT: Hartwig SCHWIER et al.

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/EP00/02311

INTERNATIONAL FILING DATE: 15 March 2000

INVENTION: METHOD, COMPUTER PROGRAMME PRODUCT AND SYSTEM FOR TRANSFERRING COMPUTER DATA TO AN OUTPUTTING DEVICE

Hon. Assistant Commissioner for Patents
Box PCT
Washington D.C. 20231

SIR:

Amend the above-identified international application before entry into the national stage before the U.S. Patent & Trademark Office under 35 U.S.C. §371 as follows:

IN THE SPECIFICATION

Enclosed is a Substitute Specification that has been amended to place the International application into form for U.S. prosecution. Also enclosed is a marked up version of the specification showing the changes made to the original application which resulted in the substitute specification.

IN THE CLAIMS

Cancel claims 1-21 without prejudice. Add new claims 22- 44 as follows:

22. A method for transmission of data from a computer system that is operated with a Windows or windows-like operating system to an output device, comprising the steps of:

generating a master document;

logically linking a plurality of auxiliary documents with the master document by forming reference indices;

sending the data of the auxiliary documents to the output device separated from data of the master document;

joining the data of the auxiliary documents with the data of the master document in the output device upon employment of the reference indices;

generating a print job from an application program including:

calling a printer driver first,

setting settings of the appertaining printer supported by the called printer driver job-specifically,

enabling the print job, as a result whereof the data of at least one of the master document and of the auxiliary documents are generated,

carrying out a check in a check step to see whether the respectively generated output format corresponds to a standard prescribed by the operating system,

supplying the data, when there is correspondence, to a print processor located in a spooler and, when non-correspondence is found in the check step, are converted by an operating system-specific converter unit into an intermediate data stream that is further-processed via various output channels.

23. A method as claimed in claim 22, further comprising the step of:

storing the data of the auxiliary documents in the output device.

24. A method as claimed in claim 22, further comprising the step of:
joining the data of the master document with the data of the auxiliary documents for output of individual documents.

25. A method as claimed in claim 22, further comprising the step of:
attaching the auxiliary documents to at least one arbitrary regions of the first document at a beginning of the output.

26. A method as claimed in claim 22, further comprising the step of:
controlling the referencing in a windows systems environment or in a windows-like system environment via data that are input via a user interface.

27. A method as claimed in claim 26, whereby the referencing ensues in a converter unit that converts an enhanced metafile data stream into a print data stream of a printer language.

28. A method as claimed in claim 26, whereby the converter unit collaborates with a print processor and a port monitor of a spooler.

29. A method as claimed in claim 22, further comprising the step of:
specifying the area of the master document wherein a respective auxiliary document is linked with the master document.

30. A method as claimed in claim 29, wherein said specifying step specifies a page region.

31. A method as claimed in claim 22, further comprising the step of:

indicating whether an auxiliary document is one of an overlay and a watermark document.

32. A method as claimed in claim 22, wherein an auxiliary document is a macro datafile.

33. A method as claimed in claim 22, wherein said output device is a printer device.

34. A method as claimed in claim 22, further comprising the step of:
transmitting an auxiliary document to the output device in the PCL print data language.

35. A method as claimed in claim 22, further comprising the step of:
transmitting an auxiliary document to the output device in the PostScript print data language.

36. A method as claimed in claim 22, further comprising the step of:
transmitting an auxiliary document to the output device in the IPDS print data language.

37. A method as claimed in claim 22, further comprising the step of:
transmitting an auxiliary document to the output device in the LCDS print data language.

38. A method as claimed in claim 22, wherein an auxiliary document contains graphics information.

39. A method as claimed in claim 38, wherein said graphics information is one of an image datafile and a diagram.

40. A method for transmission of data from a computer system that to an output device, comprising the steps of:

providing a master document having a variable data area and a static data area;
marking the variable data area;
inserting variable data into the variable data area, as a result whereof a serial data stream with individual documents arises;
separating the variable data from the serial data stream from the static data on a basis of the marking;
transmitting the variable data separated from the static data from the first individual document to the output device;
storing the static data of the first individual document in the output device;
the static data of following individual documents are not transmitted to the output device; and
joining the variable data in turn with the stored static data individual document by individual document in the output device.

41. A method as claimed in claim 40, wherein said marking step of the variable data region ensues by a visually perceptible identification.

42. A method according to claim 40, wherein said marking step of the variable data region ensues chromatically.

43. A computer program product, comprising:
elements for the implementation of a method for transmission of data from a computer system that is operated with a Windows or windows-like operating system to an output device, including:
generating a master document;
logically linking a plurality of auxiliary documents with the master document by forming reference indices;
sending the data of the auxiliary documents to the output device separated from data of the

master document;

joining the data of the auxiliary documents with the data of the master document in the output device upon employment of the reference indices;

generating a print job from an application program including:

calling a printer driver first,

setting settings of the appertaining printer supported by the called printer driver job-specifically,

enabling the print job, as a result whereof the data of at least one of the master document and of the auxiliary documents are generated,

carrying out a check in a check step to see whether the respectively generated output format corresponds to a standard prescribed by the operating system,

supplying the data, when there is correspondence, to a print processor located in a spooler and, when non-correspondence is found in the check step, are converted by an operating system-specific converter unit into an intermediate data stream that is further-processed via various output channels.

44. A system including at least one computer for implementation of a method for transmission of data from a computer system that is operated with a Windows or windows-like operating system to an output device, comprising the steps of:

generating a master document;

logically linking a plurality of auxiliary documents with the master document by forming reference indices;

sending the data of the auxiliary documents to the output device separated from data of the master document;

joining the data of the auxiliary documents with the data of the master document in the output device upon employment of the reference indices;

generating a print job from an application program including:

calling a printer driver first,

setting settings of the appertaining printer supported by the called printer driver job-specifically,

enabling the print job, as a result whereof the data of at least one of the master document and of the auxiliary documents are generated,

carrying out a check in a check step to see whether the respectively generated output format corresponds to a standard prescribed by the operating system,

supplying the data, when there is correspondence, to a print processor located in a spooler and, when non-correspondence is found in the check step, are converted by an operating system-specific converter unit into an intermediate data stream that is further-processed via various output channels.

IN THE ABSTRACT

Please add the following:

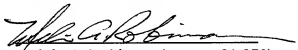
Abstract of the Disclosure

A method for printing multiple documents marks variable data that changes from document as compared to static data that remains the same in each document. The marking is by , for example, a marking in a color which the printer is not capable of printing. The combined variable and static data are fed to the printer and printed. The static data is stored in the printer and only the variable data is sent to the printer for subsequent documents.

REMARKS

The foregoing amendments to the specification and claims under Article 41 of the Patent Cooperation Treaty place the application into a form for prosecution before the U.S. Patent and Trademark Office under 35 U.S.C. §371. Accordingly, entry of these amendments before examination on the merits is hereby requested.

Respectfully submitted,



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SPECIFICATION

TITLE

"METHOD, COMPUTER PROGRAM PRODUCT AND SYSTEM FOR THE TRANSMISSION OF COMPUTER DATA TO AN OUTPUT DEVICE"

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention is directed to a method, a computer program product and a system or, respectively, an apparatus for the transmission of data from a computer system to an output device, particularly print data to a printer device.

Description of the Related Art

A printer device is connected to many computer systems. Different print data format have thereby established themselves dependent on the system environment. For example, the PCL® and PostScript® print data formats are standard in the Windows® environment. Given these print data formats, the data (documents) to be output are sent to the printer completely packed.

In contrast to the PCL® and PostScript® formats that have just been described, print data can be separated into resources (scripts, forms, layouts, etc.) and variable data given other print data formats such as AFPDS (Advanced Function Presentation Data Stream) or IPDS (Intelligent Print Data Stream). The resources and the variable data are thereby merged in relatively late processing steps, i.e. only shortly before the printing. European Patent Document EP-A-0 131 966 discloses a corresponding printing system that receives a print job containing a plurality of documents from a host computer, whereby form data and variable data of a document are transmitted separately from one another. The form data, as well as data that occur multiply in a plurality of documents, are transmitted only once per print job, are stored in the printing system and are employed for printing a plurality of

individual documents. The variable data, in contrast, are transmitted once per document.

Computers in a typical office environment (office domain) are frequently equipped with a Windows® operating system or similar operating system such as Linux® and Macintosh®. The PCL® and PostScript® print data languages are standard in this office domain, i.e. given relatively low printing outputs up to approximately 40 pages per minute. In contrast, the AFPDS (Advanced Function Presentation Data Stream) and IPDS (Intelligent Printer Data Stream) data streams are standard in the high-performance printing field above 40 pages per minute.

Specific properties of the data output given windows-like operating systems as well as their application programs such as, for example, the program Word for Windows®, the print languages such as PCL® or PostScript® allocated to them, become especially clear given printout of series documents, i.e. given the use of what is referred to as the mail-merge function. Such series documents are usually composed of individual documents that are composed of static, repeatedly reoccurring data (a master, or master document) and modifiable/variable data that are introduced into the master or, respectively, into the master document. With reference to the overall document, the variable data in a series document generally only amount to a fraction of the data quantity. The static part thus defines the necessary performance parameters of the system (RAM memory, disk storage, transmission capacity, etc.) in order to achieve a performance-suited printing speed.

Relatively small documents, i.e. individual pages, reports or books (up to approximately 300 pages) can be printed without further ado as packed documents. In contrast thereto, printing series documents in this way can lead to substantial time

delays because the static data must be continuously transmitted from the generating computer system to the printer device, i.e. with every individual document.

Another problem given this way of printing is the design of documents with auxiliary information, for example linking images in or the introduction of forms into the documents. These auxiliary information are frequently not produced together with the document to be printed out but often derive from a different data source and are sometimes designed in an involved way in order to be able to be employed for a plurality of applications.

When printing out documents from user programs, for example from Word for Windows®, these auxiliary information are previously generally inserted into the document via an editor (for example, via the Word program). When this document is to be multiply output, particularly as a series document, then there is again the problem that the auxiliary information must be processed given each document, i.e. the data stream repeatedly contains the same information and, thus, redundancy.

There is the same problem when individual forms, banner, header or trailer pages are attached to the document via a Windows printer driver.

SUMMARY OF THE INVENTION

An object of the invention is to achieve a high throughput of documents given the output of document data from a computer to an output device.

This object and others are achieved by a method for the transmission of data from a computer system that is operated with a Windows or windows-like operating system to an output device, whereby a master document is generated; a plurality of auxiliary documents are logically linked with the master document by forming

reference indices; the data of the auxiliary documents are sent to the output device separated from the data of the master document; and the data of the auxiliary documents are joined with the data of the master document in the output device upon employment of the reference indices, whereby a print job is generated from an application program such that a printer driver is first called, the settings of the appertaining printer supported by the called printer driver are then set job-specifically, the print job is then enabled, as a result whereof the data of the master document and/or of the auxiliary documents are generated, a check is then carried out in a check step to see whether the respectively generated output format corresponds to a standard prescribed by the operating system, the data, when there is correspondence, are supplied to a print processor located in a spooler and, when non-correspondence is found in the check step, are converted by an operating system-specific converter unit into an intermediate data stream that can be further-processed via various output channels.

In preferred developments, the data of the auxiliary documents are stored in the output device. The data of the master document may be joined with the data of the auxiliary documents for the output of individual documents. The auxiliary documents can be respectively attached to one or more arbitrary regions of the first document at the beginning of the output. In a windows systems environment or in a windows-like system environment the referencing may be controlled via data that are input via a user interface. The referencing preferably ensues in a converter unit that converts an enhanced metafile data stream into a print data stream of a printer language. Specifically, the converter unit collaborates with a print processor and a port monitor of a spooler.

The master document, particularly the page region, wherein a respective auxiliary document is to be linked with the master document can be specified. In one embodiment, whether an auxiliary document is an overlay or a watermark document is indicated. In one example, an auxiliary document is a macro datafile. A printer device can be employed as the output device. Preferably, an auxiliary document is transmitted to the output device in the PCL print data language, in the PostScript print data language, in the IPDS print data language, or in the LCDS print data language.

The auxiliary document may contain graphics information, particularly an image datafile or a diagram. The master document can include a variable data area and a static data area; the variable data area is marked; variable data are inserted into the variable data area, as a result whereof a serial data stream with individual documents arises; the variable data from the serial data stream are separated from the static data on the basis of the marking; the variable data separated from the static data from the first individual document are transmitted to the output device; the static data of the first individual document are stored in the output device; the static data of the following individual documents are not transmitted to the output device; and the variable data are in turn joined with the stored, static data individual document by individual document in the output device. Preferably, the marking of the variable data region ensues by means of a visually perceptible identification. The marking can be chromatic.

The present invention also provides a computer program product including elements for the implementation of the method set forth above. The invention also

provides a system for the implementation of a above method utilizing at least one computer.

The invention is based on the perception that a data stream wherein static and variable data are inseparably connected to one another arises given the output of series documents from Windows® or windows-like applications. The invention has recognized that a separation of these data into static and variable parts -- even when these parts were already previously joined (packed) -- allows the output on a printer device or some other output device to become significantly more efficient and high-performance.

According to a first aspect of the invention, at least one auxiliary document, for example one or more PCL macros, is optionally attached to one or more arbitrary regions (pages) of an existing but arbitrary master document at the beginning of the output, particularly at the beginning of a printout. Particularly given series documents, it is thereby adequate to undertake the allocation only once for the master document. The allocation can then be valid, i.e. activated, for all individual documents. The allocation ensues by means of a logical linking of the two documents, particularly by means of a referencing. Additional parameters can thereby preferably be indicated, for example the position of the second document within the first document. The second document is particularly characterized in that it has a predetermined, non-variable data content (for example, graphics areas or non-variable text components). Within a typical Windows® environment, the referencing is thereby particularly controlled via data that are input via a user interface. The referencing then ensues within a converter unit that converts a

windows-specific enhanced metafile data stream (EMF data stream) into a print data stream such as, for example, PCL® or PostScript®.

In advantageous embodiments of the first aspect of the invention, the page region of the master document in which the second document is joined to the master document is indicated. The integration of the second document can ensue in various modes, for example as an overlay or was a watermark.

According to a second aspect of the invention, a separation of static and variable data ensues during the output of the data. For example, the variable data are filtered out of the print data stream and further-processed differently than the static data. Whereas the variable data are completely transmitted from the computer to the output device, the static data -- insofar as they repeat -- are transmitted only once from the computer to the output device. As a result thereof, the quantity of data can be considerably reduced and, thus, the performance capability of the printout can be significantly enhanced.

In a system wherein variable and static data are initially connected to one another, a renewed separation of the variable data from the static data ensues in an intermediate step according to this second aspect of the invention before the data are transmitted to the printer device. In order to be able to implement this separation, the variable data are previously provided with a suitable marking; in particular, they are identified chromatically. In particular, the marking already ensues in the production of the document by marking the wildcards at which the variable data are inserted. Preferably, the marking is no longer visible given the output of the data in the printer device.

The inventive separation between variable data and static data can already ensue in the source format of the application (for example, directly in the editor) or in an operation following the application, for example during the course of the conversion of a Windows document into the EMF format or within the EMF format. In particular, the separation can ensue in a following filtering for the EMF conversion and, in particular, given the conversion of the data stream into a print language such as PCL or postscript. The invention makes an intelligent printer driver possible with which extensive print data streams can be transmitted to a printer device at high speed.

According to the second aspect of the invention, a limitation of the static data particularly ensues, i.e. a particular about the scope that the data occupy. As a result of this limitation, a document-exact and location-exact allocation (referencing) of the variable data to the static data can ensue in a simple way in the following filter operation.

Packed datafiles multiply containing one and the same static data occur not only in PCL and postscript printing data streams but also definitely occur in AFPDS, IPDS and in LCDS data streams. Further, documents/data streams that are generated in a first printer language (for example, in PostScript) can also have data (documents, macro datafiles) that have been generated in other languages (for example, IPDS overlays, IPDS page segments or PCL macros) embedded in them. The invention is therefore suited for the optimum output of any data streams.

What is particularly understood as the output device for the invention is a printer device. Nonetheless, the invention can also be employed in conjunction with other output devices by themselves or in combination with a printer device. For

example, a print server, a CD-ROM writer device or a print data archive can also serve as the output device, as disclosed in the PCT Patent Application PCT/EP98/05460. The content of this application or, respectively, of the publications resulting therefrom are herewith incorporated by reference into the present specification.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention are explained in greater detail below on the basis of some Figures.

Figure 1 is a functional block diagram of a printing system.

Figure 2 is a block diagram of a data stream in the printing system.

Figure 3 is a display on a computer screen for specifying a selection mask.

Figure 4 is a display on a computer screen for specifying a second selection mask.

Figure 5 is a block diagram showing elements of a series document.

Figure 6 is a block diagram showing a second data stream.

Figure 7 is a display on a computer screen for specifying a further selection mask.

Figure 8 is a flow diagram of a standard Windows system environment.

Figure 9 is a flow diagram of a modified Windows system environment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a personal computer 1 with a connected printer 7. In a known way, the personal computer 1 contains a central processor unit (CPU) 2, a monitor 3

connected thereto, as well as an input device 4 (such as a keyboard, mouse, touch screen or the like), a main memory 5 and a hard disk 6. The computer 1 is connected to the printer 7 via the interface 9. The personal computer 1 is operated with an operating system, for example with Microsoft Windows 95® or Windows NT. Various application programs in turn run under this operating system, for example the application 10 Winword 97® from the Microsoft Office 97® package. How variable and static data of a series letter from the Winword application are printed is explained with reference to the example of Figure 2. Variable data 11 and static data 12 that are stored in the main memory 5 and/or on the hard disk 6 are thereby incorporated into the application. For this purpose, the user can produce a master document in the Winword program 10, static data areas and variable data areas being provided in the master document. The variable data areas are intended to be filled with variable data that are stored in a separate datafile (such as a Word document, data bank, Excel document, etc.). Further details about this series letter production are set forth, for example, on pages 75 through 93 in the book by Rainer-Walter Schwabe, Word 97: leicht, klar, sofort, Markt- und Technik-Verlag, Haar (1997), ISBN 3-8272-5267-3. This description is herewith incorporated by reference into the present specification.

Wildcards for the variable data are thereby created in the variable data areas of the Winword master document, for example with the specifier <<name>>. When the series letter is called, the variable datum in these wildcards is then taken record-by-record from the field "Name" of the datafile that contains the variable data.

In order to print out the series letter, i.e. the individual documents with the respectively inserted, variable data, the wildcards for the variable data, for example

<<name>>, are distinguished from the static data of the master document with a suitable marking. This occurs, for example, by formatting the wildcards in a specific color. The color should thereby be selected such that the printer is not in the position of printing out data in this color. A color is thus employed that lies outside the reproducible color spectrum of the printer. This type of marking can assure that the visual appearance of the document output on the printer 7 is not affected by the marking. The marking can ensue in a known way within the application 10, i.e. with the command "Format|Character" of the application Word for Windows in the present example.

Before a document is printed out from the application, two particulars that control the rest of the printout must be produced. First, what properties the marking of the wildcards for variable data has must be specified. In the present example, this is the marking of the wildcards with the color red (also see Figure 4). Second, the scope of the master document must be indicated. The individual documents of the series letter can be distinguished or, respectively, separated from one another with this specifier in the later filter operation.

For printing out the series letter, the wildcards in the variable data areas of the master document are replaced record-by-record in the application 10 by the corresponding variable data 11 of the variable data memory, and a data stream or, respectively, a datafile of the entire document, i.e. of the static and of the variable data, is generated in the Enhanced Metafile Format (EMF) 13. In this EMF spooling, which is implemented via a Windows printer driver given output of the series letter, each individual document of the series letter or, respectively, of the series document is respectively newly constructed from the master document. In order to avoid a

redundant data repetition of the static data, the static part 16 and the variable part 15 of the individual documents from the series letter data stream are respectively separated from one another in the filter operation 14. The variable data are thereby recognized on the basis of their marking that was previously undertaken as described above. In addition to this marking information, the scope of the master document, for example the number of pages it fills, is also needed in this filter operation. As a result thereof, the individual documents can be distinguished from one another in the filter event.

In the filter event 14, the static data are separated from the variable data on the basis of the marking of the variable data and on the basis of the indicated limitation (number of pages of the master document). The static data are transmitted to the printer device 7 and are stored as a form or a macro in the main memory 8. The capacity of the main memory is thereby fashioned of such a size that a plurality of documents (the macros, or forms) as well as their appertaining referencing data can be simultaneously stored therein. The main memory, such as RAM (Random Access Memory), can thereby typically amount, for example, to 4, 8, 64, 128, 512 or even more megabytes (MB) or can also be fashioned as a hard disk with memory capacities of a number of gigabytes that are typical thereof. A combination of the two memory types (RAM and hard disk) can also be meaningful, whereby documents (macros, etc.) of a print job that are called more often are stored in the RAM and documents that are called less often, for example documents (macros) of the print job that are called only once, are stored on the hard disk.

The variable data, in contrast, together with all needed characteristics (for example, indications of position on the individual document, color particulars, font

particulars) are separately transmitted, likewise to the printer device. The transmission of the variable data and of the static data from the computer system 1 to the printer device 7 can ensue via the same data line, whereby, however, a logical discrimination (separability) between the data must be retained.

Beginning with the second individual document, only the filtered, variable data are then transmitted to the printer device 7, as a result whereof a considerable reduction of the data stream between computer system 1 and printer system 7 is achieved.

Within the printer device 7, the received, variable data are mixed again with the static data and printed in common on a recording medium (paper, labels, films, etc.).

In the second and in all further individual documents, the static data 16 are discarded in the computer 1 or, respectively, within the PCL converter 18 and are not transmitted to the printer device 7. In contrast, the variable data 15 together with their characteristic particulars are transmitted to the printer device individual document by individual document. In the printer device 7, these variable data 15 are then merged by an OR-operation with the static data stored in the memory 8.

The filter event 14 precedes the conversion of the data into a PCL data stream. However, it occurs within the PCL converter 18.

A postscript converter or some arbitrary other converter that is standard in the respective system environment can also be employed instead of a PCL converter. The filter event 14 can also be directly applied onto the EMF intermediate datafile or, respectively, the EMF intermediate data stream 13 or can be applied to the source

text of the editor (for example, in Word). The filtered, variable data 15 or, respectively, static data 16 are then already enter in the PCL converter.

Figure 3 shows a selection window that is selected before the printing event from the application ensues into the EMF intermediate datafile (event 13). The input window 20 contains a first selection window 21 in which two print modes can be selected. In the first print mode (standard), print data from the windows application are printed out in a standard way, i.e. the filter procedure (event 14) does not occur. Series letters are then transmitted to the printer device 7 individual document by individual document. The above-described filter procedure (event 14) is activated by selecting the option "extended mail processing" in the mode window 21.

The scope of the master document can be specified in the selection window 22. As a result thereof, the separation of the individual document pages is enabled in the filter event.

The color property with which the wildcards of variable data were marked in the master document is indicated in the selection window 23. Figure 4 shows various selection fields (black/gray, red, green, blue) for these markings.

Whether the dynamic texts are to be printed differently in the printer device 7, for example in a highlight color, can be optionally indicated in the selection window. This assumes that the printer device is in the position to print in two colors, whereby the standard texts are printed in the first color and the dynamic texts are printed in the second color. The first color, for example, is thereby black and the second color is blue (a highlight color) or vice versa.

In a further embodiment of the invention, the dynamic texts can be marked in a first color that cannot be presented by the printer. The variable data marked in this

way are printed out in the same color as the static data. Other variable data, in contrast, are marked in a second color and printed out in the second ink (highlight color) of the printer device. The possibility of indicating different output colors is thus created, even given dynamic data.

Figure 5 shows a master document 25. It is composed of static data 26 and of the three variable wildcards 27, 28 and 29 (title, name, competency). The length of the master document amounts to one page. Variable data are stored in the datafile 30 in the fields name, competency and title. The master document 25 and the variable data 30 are combined into the series document 31, whereby the static text part 33 that corresponds to the static data 16 (Figure 2) is extracted from the first series document 32. These data are employed for generating the second individual document 33 (see Figure 2).

Figure 6 shows how an auxiliary information can be linked into an existing document. As indicated in the preceding examples or, respectively, Figures, let the application here also be the program Winword. A macro 36 that contains an external data source 37 is linked into the Winword document 35. For example, the macro 36a contains an image datafile 37a. The macro 36b contains a line diagram 37b and the macro 37c contains a bar diagram 37c. In the event 38, the macros 36a, 36b and 36c can be optionally selected either individually or a plurality of them at once for linking into the Winword document 35. On which pages and at which position within the individual pages of the Winword document 35 the macro or the respective macros are to be placed is also indicated in this event. A print data stream 39 is generated therefrom, whereby the individual pages 39a, 39b and 39c are provided with the respective reference index macro data M1, M2 and M3.

These information (reference index data M1, M2 and M3) are converted into the PCL language and are sent to the printer device 7. Simultaneously, the complete macro information (particularly graphics data) are converted (insofar as they are not already in PCL format) and are transmitted into the printer device 7 separated from the series letter information, i.e. separated from the series print data stream in terms of time and/or in data-oriented fashion, and are deposited in the main memory 8 thereat. A plurality of and, in particular, all complete macro data (graphics information, etc.) required for the print job are thereby stored in the main memory 8. Within the printer device 7, the series letter data (i.e. the series print data stream) are then reunited with the corresponding, complete macro data upon employment of the reference index data M1, M2 and M3, i.e. the page 39a is output upon employment of the reference index M1 with the macro 36a (i.e. with the complete print data of the macro 36a), the page 39b is output upon employment of the reference index M2 with the complete data of the macro 36b, and the page 39c is output upon employment of the reference index M3 with the data of the macro 36c. The referencing, i.e. the logical linking between specific document pages (39a, 39b and 39c) with the allocated macros 36a, 36b and 36c, occurs in the unit 38 in that the reference indices or, respectively, reference index data M1, M2 and M3 are formed.

In the example of Figure 6, the individual document comprises the three pages 39a, 39b and 39c. When the document 35 is a series document, then it suffices to make the allocation for an individual document (master document), so that this allocation is valid for all individual documents. The individual documents can thereby be individual pages or -- as shown in Figure 6 -- can comprise a plurality

of pages. The advantage of this procedure described for the macro linking is once again that the reoccurring information -- macros here -- need be transmitted only once from the computer 1 to the printer device 7 and can be linked from the main memory in the computer to individual documents as often as desired. Here, too, the quantity of data to be transmitted between computer 1 and printer device 7 is minimal because macros in the individual documents are not transmitted completely but only by indicating their reference index 2 (M1, M2 and M3).

Figure 7 shows a selection window that is called in the referencing unit 38 in the computer 1. Presets for macros can be undertaken in the window 41, i.e. standardized macro collections and/or links to specific document pages can be deposited. Additional, new macros can be selected for a macro preset via the selection key 42. The position of the macro on specific document pages can be defined in the selection field, for example on all pages, on even-numbered or odd-numbered pages or on specific page numbers. The placement type as an overlay (a complete superimposition) or a watermark (the macro information only in the background) within the document can be selected with the selection field 44.

Figure 8 shows a structure diagram according to which a print event normally sequences within a Windows® operating system running on a computer. What is referred to as a "User-Mode Client" (GDI32.dll) 46 is thereby called proceeding from an application 45, this "User-Mode Client" 46 driving the display device (Graphic Device Interface, GDI). Various printer drivers can thereby be called and the settings of the appertaining printer supported by the respective driver can be set job-specifically. After these settings have been carried out and the print job has been enabled (printing "OK"), a standard check is carried out under Windows to see

whether the output format that is thereby generated corresponds to the EMF standard (EMF stands for Enhanced Metafile Format). When this is the case, the print data stream is supplied as a EMF data stream to a print processor 49 situated in the spooler 50, being supplied thereto via a spool datafile 48. The data are supplied therefrom to a port monitor 51 and are supplied to the destination printer device 52 as what is referred to as a RAW data stream, i.e. as a data stream in a printer language such as, for example, PCL that is matched to the destination printer device. The port monitor 51 thereby controls the output of the data to the output channel (LPT1, LPT2) of the computer allocated to the destination printer device.

When the query 47, however, yields that the document generated in the application 45 is not in EMF format, then what is referred to as a kernel mode 53 is activated wherein a GDI rendering engine (GRE), i.e. the program element "win32k.sys" 54 collaborates with the kernel mini control module 55. A RAW data stream is thereby generated that, as a RAW spool datafile 56, is in turn supplied to the print processor 49 in the spooler 50. From there, the handover via the port monitor 51 to the output device 52 in turn ensues as a RAW data stream.

How the aspects of the invention described in conjunction with Figures 6 and 7 are implemented within a Windows environment becomes clear in Figure 9. As a result of the invention, the referencing of various documents (a master document, macro, and an overlay) in such a Windows® environment is controlled via data that are input via a user interface or, respectively, via an input module 59. The referencing ensues within a converter unit 58 that converts a windows-specific Enhanced Metafile data stream (EMF data stream) into a PCL print data stream (RAW data stream of the destination printer).

The processing of a data output (printing) proceeding from the application 45 (for example, Word) initially ensues according to Figure 9 exactly as in the standard Windows® environment according to Figure 8. However, an inventively modified driver is employed as the printer driver in Figure 9, this generating a data stream in the EMF format, as a result whereof a spool file 48 is directly generated under Windows or, respectively, via the query 47, and the spool file is supplied to an inventively adapted print processor 56 in the Windows spooler 50. The kernel mode 43 or, respectively, the modules GRE 54 and kernel mini 55 called therein are not supported by the driver, this being indicated by the cross 57 in Figure 9.

Another inventive adaptation is comprised in the print processor 56 that is located in the spooler 50. In contrast to the standard Windows environment of Figure 8, this "Enhanced Print Environment (EPE) Print Processor" 56 does not forward the EMF data directly to the port monitor 51 but calls the converter unit 58, wherein the EMF data stream is converted into a PCL print data stream. The conversion is thereby controlled by the parameters that were previously input via the input module 59 (OPS PCL user interface). Among other things, the input module 59 effects the display of the macro window 40 shown in Figure 7 for this purpose. The output can also ensue into various channels via settings that are either controlled via the input module 59 or, too, directly via the printer driver, which collaborates with the GDI user mode client 46. The output of these PCL-RAW print data can thereby ensue either into an output datafile (channel 1) that, for example, is stored on the hard disk or directly to an SCSI-capable printer (channel 2) or back again into the spooler 50 to the port monitor 51 and from the latter via a standard interface (channel 3) to a destination printer device 52.

Exemplary embodiments of the invention have been described. It is thereby clear that, instead of the described Winword application program, other applications, presentation programs, table calculation programs, image processing programs beside text processing programs or other programs standard in the computer field can effectively use the invention. Instead of the PCL printer language that has been described, of course, other printer languages can also be employed, for example PostScript, AFPDS, IPDS, PDF or LCDS, particularly when a completely packed data stream is present that is not resolved into individual constituents such as scripts, forms, etc.

The invention has created an intelligent printer driver or, respectively, an intelligent pre-stage for printing with which the data stream between an application computer and a printer device can be significantly reduced. As a result thereof, a higher document throughput can be achieved in the output. The invention can be applied both in a single-location system wherein a computer is connected to a printer as well as in a network system wherein a plurality of computers send print data to one or more printer devices. Instead of transmitting the data directly to the printer device, they can be sent from the printing system in which the data are generated to the printer via a print server. Such a system is described, for example, in Druckerbuch, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Poing, Edition 3c (May 1998), ISBN 3-00-001019-X, pages 12-1 through 12-8. This description as well as the corresponding English-language description in The World of Printers, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Edition 3a (November 1998), ISBN 3-00-001081-5, pages 12-1 through 12-8, are herewith likewise incorporated by reference into the present specification.

When the inventive separation between variable data and static data already ensues in the source format of the application (for example, directly in the editor), then it is possible to further automate or, respectively, accelerate the output of data streams in that the static part is further-processed separately from the variable part, for example by conversion of the static part into a macro datafile (for example, in PCL), transmission to the output device, storing thereat and loading the macro in the print generator as needed. The filtering of the data stream can be eliminated by means of this further automation step.

The invention is particularly suited for use in Windows systems and in windows-like systems such as Linux or Macintosh operating systems that at least partly comprise identical or similar systems components as Windows.

The invention can appear in the greatest variety of embodiments, for example as a computer datafile, as a program module, as a program element, as a program library or as a collection of a plurality of individual datafiles. This embodiment of the invention, which is particularly contained in computer program products such as a memory element, a diskette, a disk storage, a CD-ROM, a programmable electronic module (ROM, PROM, EPROM), can also be spread via data networks, for example as datafile attachment of an e-mail as well as via the Internet.

Although other modifications and changes may be suggested by those skilled in the art, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.

SPECIFICATION

TITLE

"METHOD, COMPUTER PROGRAM PRODUCT AND SYSTEM FOR THE TRANSMISSION OF COMPUTER DATA TO AN OUTPUT DEVICE"

BACKGROUND OF THE INVENTION

Field of the Invention

The present ~~The~~ invention is directed to a method, a computer program product and a system or, respectively, an apparatus for the transmission of data from a computer system to an output device, particularly print data to a printer device.

Description of the Related Art

A printer device is connected to many computer systems. Different print data format have thereby established themselves dependent on the system environment. For example, the PCL® and PostScript® print data formats are standard in the Windows® environment. Given these print data formats, the data (documents) to be output are sent to the printer completely packed.

In contrast to the PCL® and PostScript® formats that have just been described, print data can be separated into resources (scripts, forms, layouts, etc.) and variable data given other print data formats such as AFPDS (Advanced Function Presentation Data Stream) or IPDS (Intelligent Print Data Stream). The resources and the variable data are thereby merged in relatively late processing steps, i.e. only shortly before the printing. **European Patent Document** EP-A-0 131 966 discloses a corresponding printing system that receives a print job containing a plurality of documents from a host computer, whereby form data and variable data of a document are transmitted separately from one another. The form data, as well as data that occur multiply in a plurality of documents, are transmitted only once per

print job, are stored in the printing system and are employed for printing a plurality of individual documents. The variable data, in contrast, are transmitted once per document.

Computers in a typical office environment (office domain) are frequently equipped with a Windows® operating system or similar operating system such as Linux® and Macintosh®. The PCL® and PostScript® print data languages are standard in this office domain, i.e. given relatively low printing outputs up to approximately 40 pages per minute. In contrast, the AFPDS (Advanced Function Presentation Data Stream) and IPDS (Intelligent Printer Data Stream) data streams are standard in the high-performance printing field above 40 pages per minute.

Specific properties of the data output given windows-like operating systems as well as their application programs such as, for example, the program Word for Windows®, the print languages such as PCL® or PostScript® allocated to them, become especially clear given printout of series documents, i.e. given the use of what is referred to as the mail-merge function. Such series documents are usually composed of individual documents that are composed of static, repeatedly reoccurring data ~~(master;~~**(a master, or** master document) and modifiable/variable data that are introduced into the master or, respectively, into the master document. With reference to the overall document, the variable data in a series document generally only amount to a fraction of the data quantity. The static part thus defines the necessary performance parameters of the system (RAM memory, disk storage, transmission capacity, etc.) in order to achieve a performance-suited printing speed.

Relatively small documents, i.e. individual pages, reports or books (up to approximately 300 pages) can be printed without further ado as packed documents.

In contrast thereto, printing series documents in this way can lead to substantial time delays because the static data must be continuously transmitted from the generating computer system to the printer device, i.e. with every individual document.

Another problem given this way of printing is the design of documents with auxiliary information, for example linking images in or the introduction of forms into the documents. These auxiliary information are frequently not produced together with the document to be printed out but often derive from a different data source and are sometimes designed in an involved way in order to be able to be employed for a plurality of applications.

When printing out documents from user programs, for example from Word for Windows®, these auxiliary information are previously generally inserted into the document via an editor (for example, via the Word program). When this document is to be multiply output, particularly as a series document, then there is again the problem that the auxiliary information must be processed given each document, i.e. the data stream repeatedly contains the same information and, thus, redundancy.

There is the same problem when individual forms, banner, header or trailer pages are attached to the document via a Windows printer driver.

SUMMARY OF THE INVENTION

An object of the invention is to achieve a high throughput of documents given the output of document data from a computer to an output device.

This object ~~is achieved by the invention recited in the independent claims. Advantageous embodiments of the invention are the subject matter of the subclaims.~~ **and others are achieved by a method for the transmission of data**

from a computer system that is operated with a Windows or windows-like operating system to an output device, whereby a master document is generated; a plurality of auxiliary documents are logically linked with the master document by forming reference indices; the data of the auxiliary documents are sent to the output device separated from the data of the master document; and the data of the auxiliary documents are joined with the data of the master document in the output device upon employment of the reference indices, whereby a print job is generated from an application program such that a printer driver is first called, the settings of the appertaining printer supported by the called printer driver are then set job-specifically, the print job is then enabled, as a result whereof the data of the master document and/or of the auxiliary documents are generated, a check is then carried out in a check step to see whether the respectively generated output format corresponds to a standard prescribed by the operating system, the data, when there is correspondence, are supplied to a print processor located in a spooler and, when non-correspondence is found in the check step, are converted by an operating system-specific converter unit into an intermediate data stream that can be further-processed via various output channels.

In preferred developments, the data of the auxiliary documents are stored in the output device. The data of the master document may be joined with the data of the auxiliary documents for the output of individual documents. The auxiliary documents can be respectively attached to one or more arbitrary regions of the first document at the beginning of the output. In a windows systems environment or in a windows-like system environment the

referencing may be controlled via data that are input via a user interface. The referencing preferably ensues in a converter unit that converts an enhanced metafile data stream into a print data stream of a printer language. Specifically, the converter unit collaborates with a print processor and a port monitor of a spooler.

The master document, particularly the page region, wherein a respective auxiliary document is to be linked with the master document can be specified. In one embodiment, whether an auxiliary document is an overlay or a watermark document is indicated. In one example, an auxiliary document is a macro datafile. A printer device can be employed as the output device. Preferably, an auxiliary document is transmitted to the output device in the PCL print data language, in the PostScript print data language, in the IPDS print data language, or in the LCDS print data language.

The auxiliary document may contain graphics information, particularly an image datafile or a diagram. The master document can include a variable data area and a static data area; the variable data area is marked; variable data are inserted into the variable data area, as a result whereof a serial data stream with individual documents arises; the variable data from the serial data stream are separated from the static data on the basis of the marking; the variable data separated from the static data from the first individual document are transmitted to the output device;
the static data of the first individual document are stored in the output device; the static data of the following individual documents are not transmitted to the output device; and the variable data are in turn joined with the stored, static

data individual document by individual document in the output device. Preferably, the marking of the variable data region ensues by means of a visually perceptible identification. The marking can be chromatic.

The present invention also provides a computer program product including elements for the implementation of the method set forth above. The invention also provides a system for the implementation of a above method utilizing at least one computer.

The invention is based on the perception that a data stream wherein static and variable data are inseparably connected to one another arises given the output of series documents from Windows® or windows-like applications. The invention has recognized that a separation of these data into static and variable parts -- even when these parts were already previously joined (packed) -- allows the output on a printer device or some other output device to become significantly more efficient and high-performance.

According to a first aspect of the invention, at least one auxiliary document, for example one or more PCL macros, is optionally attached to one or more arbitrary regions (pages) of an existing but arbitrary master document at the beginning of the output, particularly at the beginning of a printout. Particularly given series documents, it is thereby adequate to undertake the allocation only once for the master document. The allocation can then be valid, i.e. activated, for all individual documents. The allocation ensues by means of a logical linking of the two documents, particularly by means of a referencing. Additional parameters can thereby preferably be indicated, for example the position of the second document within the first document. The second document is particularly characterized in that

it has a predetermined, non-variable data content (for example, graphics areas or non-variable text components). Within a typical Windows® environment, the referencing is thereby particularly controlled via data that are input via a user interface. The referencing then ensues within a converter unit that converts a windows-specific enhanced metafile data stream (EMF data stream) into a print data stream such as, for example, PCL® or PostScript®.

In advantageous embodiments of the first aspect of the invention, the page region of the master document in which the second document is joined to the master document is indicated. The integration of the second document can ensue in various modes, for example as **an** overlay or was **a** watermark.

According to a second aspect of the invention, a separation of static and variable data ensues during the output of the data. For example, the variable data are filtered out of the print data stream and further-processed differently than the static data. Whereas the variable data are completely transmitted from the computer to the output device, the static data -- insofar as they repeat -- are transmitted only once from the computer to the output device. As a result thereof, the quantity of data can be considerably reduced and, thus, the performance capability of the printout can be significantly enhanced.

In a system wherein variable and static data are initially connected to one another, a renewed separation of the variable data from the static data ensues in an intermediate step according to this second aspect of the invention before the data are transmitted to the printer device. In order to be able to implement this separation, the variable data are previously provided with a suitable marking; in particular, they are identified chromatically. In particular, the marking already

ensues in the production of the document by marking the wildcards at which the variable data are inserted. Preferably, the marking is no longer visible given the output of the data in the printer device.

The inventive separation between variable data and static data can already ensue in the source format of the application (for example, directly in the editor) or in an operation following the application, for example during the course of the conversion of a Windows document into the EMF format or within the EMF format. In particular, the separation can ensue in a following filtering for the EMF conversion and, in particular, given the conversion of the data stream into a print language such as PCL or postscript. The invention makes an intelligent printer driver possible with which extensive print data streams can be transmitted to a printer device at high speed.

According to the second aspect of the invention, a limitation of the static data particularly ensues, i.e. a particular about the scope that the data occupy. As a result of this limitation, a document-exact and location-exact allocation (referencing) of the variable data to the static data can ensue in a simple way in the following filter operation.

Packed datafiles multiply containing one and the same static data occur not only in PCL and postscript printing data streams but also definitely occur in AFPDS, IPDS and in LCDS data streams. Further, documents/data streams that are generated in a first printer language (for example, in PostScript) can also have data (documents, macro datafiles) that have been generated in other languages (for example, IPDS overlays, IPDS page segments or PCL macros) embedded in them. The invention is therefore suited for the optimum output of any data streams.

What is particularly understood as **the** output device for the invention is a printer device. Nonetheless, the invention can also be employed in conjunction with other output devices by themselves or in combination with a printer device. For example, a print server, a CD-ROM writer device or a print data archive can also serve as **the** output device, as disclosed in the PCT Patent Application PCT/EP98/05460. The content of this application or, respectively, of the publications resulting therefrom are herewith incorporated by reference into the present specification.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention are explained in greater detail below on the basis of some Figures.

~~Shown are:~~

Figure 1 **is a functional block diagram of** a printing system.

Figure 2 **is a block diagram of** a data stream in the printing system ~~Figure 3 a selection mask.~~

~~Figure 4~~ **Figure 3 is a display on a computer screen for specifying a selection mask.**

Figure 4 is a display on a computer screen for specifying a second selection mask.

Figure 5 **is a block diagram showing elements of** a series document.

Figure 6 **is a block diagram showing** a second data stream.

Figure 7 is a display on a computer screen for specifying ~~Figure 7~~ a further selection mask.

Figure 8 **is a flow diagram of** a standard Windows system environment ~~and~~,

Figure 9 **is a flow diagram of** a modified Windows system environment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a personal computer 1 with a connected printer 7. In a known way, the personal computer 1 contains a central processor unit (CPU) 2, a monitor 3 connected thereto, as well as an input device 4 ~~(~~**(such as a** keyboard, mouse, touch screen or the like), a main memory 5 and a hard disk 6. The computer 1 is connected to the printer 7 via the interface 9. The personal computer 1 is operated with an operating system, for example with Microsoft Windows 95® or Windows NT. Various application programs in turn run under this operating system, for example the application 10 Winword 97® from the Microsoft Office 97® package. How variable and static data of a series letter from the Winword application are printed is explained with reference to the example of Figure 2. Variable data 11 and static data 12 that are stored in the main memory 5 and/or on the hard disk 6 are thereby incorporated into the application. For this purpose, the user can produce a master document in the Winword program 10, static data areas and variable data areas being provided in ~~said~~ **the** master document. The variable data areas are intended to be filled with variable data that are stored in a separate datafile ~~(~~**(such as a** Word document, data bank, Excel document, etc.). Further details about this series letter production are set forth, for example, on pages 75 through 93 in the book by Rainer-Walter Schwabe, Word 97: leicht, klar, sofort, Markt- und Technik-Verlag, Haar (1997), ISBN 3-8272-5267-3. This description is herewith incorporated by reference into the present specification.

Wildcards for the variable data are thereby created in the variable data areas of the Winword master document, for example with the ~~particular~~ **specifier** <<name>>. When the series letter is called, the variable datum in these wildcards is then taken record-by-record from the field "Name" of the datafile that contains the variable data.

In order to print out the series letter, i.e. the individual documents with the respectively inserted, variable data, the wildcards for the variable data, for example <<name>>, are distinguished from the static data of the master document with a suitable marking. This occurs, for example, by formatting the wildcards in a specific color. The color should thereby be selected such that the printer is not in the position of printing out data in this color. A color is thus employed that lies outside the reproducible color spectrum of the printer. This type of marking can assure that the visual appearance of the document output on the printer 7 is not affected by the marking. The marking can ensue in a known way within the application 10, i.e. with the command "Format|Character" of the application Word for Windows in the present example.

Before a document is printed out from the application, two particulars that control the rest of the printout must be produced. First, what properties the marking of the wildcards for variable data has must be specified. In the present example, this is the marking of the wildcards with the color red (also see Figure 4). Second, the scope of the ~~mater~~ **master** document must be indicated. The individual documents of the series letter can be distinguished or, respectively, separated from one another with this ~~particular~~ **specifier** in the later filter operation.

For printing out the series letter, the wildcards in the variable data areas of the master document are replaced record-by-record in the application 10 by the corresponding variable data 11 of the variable data memory, and a data stream or, respectively, a datafile of the entire document, i.e. of the static and of the variable data, is generated in the Enhanced Metafile Format (EMF) 13. In this EMF spooling, which is implemented via a Windows printer driver given output of the series letter, each individual document of the series letter or, respectively, of the series document is respectively newly constructed from the master document. In order to avoid a redundant data repetition of the static data, the static part 16 and the variable part 15 of the individual documents from the series letter data stream are respectively separated from one another in the filter operation 14. The variable data are thereby recognized on the basis of their marking that was previously undertaken as described above. In addition to this marking information, the scope of the master document, for example the number of pages it fills, is also needed in this filter operation. As a result thereof, the individual documents can be distinguished from one another in the filter event.

In the filter event 14, the static data are separated from the variable data on the basis of the marking of the variable data and on the basis of the indicated limitation (number of pages of the master document). The static data are transmitted to the printer device 7 and are stored as **a** form or **a** macro ~~thereat~~ in the main memory 8. The capacity of the main memory is thereby fashioned of such a size that a plurality of documents (~~macros,~~**the macros, or** forms) as well as their appertaining referencing data can be simultaneously stored therein. The main memory, **such** as RAM (Random Access Memory), can thereby typically amount, for

example, to 4, 8, 64, 128, 512 or even more megabytes (MB) or can also be fashioned as **a** hard disk with memory capacities of a number of gigabytes that are typical thereof. A combination of the two memory types (RAM, **and** hard disk) can also be meaningful, whereby documents (macros, etc.) of a print job that are called more often are stored in the RAM and documents that are called less often, for example documents (macros) of the print job that are called only once, are stored on the hard disk.

The variable data, in contrast, together with all needed characteristics (for example, indications of position on the individual document, color particulars, font particulars) are separately transmitted, likewise to the printer device. The transmission of the variable data and of the static data from the computer system 1 to the printer device 7 can ensue via the same data line, whereby, however, a logical discrimination (separability) between the data must be retained.

Beginning with the second individual document, only the filtered, variable data are then transmitted to the printer device 7, as a result whereof a considerable reduction of the data stream between computer system 1 and printer system 7 is achieved.

Within the printer device 7, the received, variable data are mixed again with the static data and printed in common on a recording medium (paper, labels, films, etc.).

In the second and in all further individual documents, the static data 16 are discarded in the computer 1 or, respectively, within the PCL converter 18 and are not transmitted to the printer device 7. In contrast, the variable data 15 together with their characteristic particulars are transmitted to the printer device individual

document by individual document. In the printer device 7, these variable data 15 are then merged by an OR-operation with the static data stored in the memory 8.

The filter event 14 precedes the conversion of the data into a PCL data stream. However, it occurs within the PCL converter 18.

A postscript converter or some arbitrary other converter that is standard in the respective system environment can also be employed instead of a PCL converter. The filter event 14 can also be directly applied onto the EMF intermediate datafile or, respectively, the EMF intermediate data stream 13 or can be applied to the source text of the editor (for example, in Word). The filtered, variable data 15 or, respectively, static data 16 **are** then already enter in the PCL converter.

Figure 3 shows a selection window that is selected before the printing event from the application ensues into the EMF intermediate datafile (event 13). The input window 20 contains a first selection window 21 in which two print modes can be selected. In the first print mode (standard), print data from the windows application are printed out in a standard way, i.e. the filter procedure (event 14) does not occur. Series letters are then transmitted to the printer device 7 individual document by individual document. The above-described filter procedure (event 14) ~~isn~~ **is** activated by selecting the option "extended mail processing" in the mode window 21.

The scope of the master document can be specified in the selection window 22. As a result thereof, the separation of the individual document pages is enabled in the filter event.

The color property with which the wildcards of variable data were marked in the master document is indicated in the selection window 23. Figure ~~[...]~~ **4** shows various selection fields (black/gray, red, green, blue) for these markings.

Whether the dynamic texts are to be printed differently in the printer device 7, for example in a highlight color, can be optionally indicated in the selection window. This assumes that the printer device is in the position to print in two colors, whereby the standard texts are printed in the first color and the dynamic texts are printed in the second color. The first color, for example, is thereby black and the second color is blue ~~(~~**a** highlight color) or vice versa.

In a further embodiment of the invention, the dynamic texts can be marked ~~either [sic]~~ in a first color that cannot be presented by the printer. The variable data marked in this way are printed out in the same color as the static data. Other variable data, in contrast, are marked in a second color and printed out in the second ink (highlight color) of the printer device. The possibility of indicating different output colors is thus created, even given dynamic data.

Figure 5 shows a master document 25. It is composed of static data 26 and of the three variable wildcards 27, 28 and 29 (title, name, competency). The length of the master document amounts to one page. Variable data are stored in the datafile 30 in the fields name, competency and title. The master document 25 and the variable data 30 are combined into the series document 31, whereby the static text part 33 that corresponds to the static data 16 (Figure 2) is extracted from the first series document 32. These data are employed for generating the second individual document 33 (see Figure 2).

Figure 6 shows how an auxiliary information can be linked into an existing document. As indicated in the preceding examples or, respectively, Figures, let the application here also be the program Winword. A macro 36 that contains an external data source 37 is linked into the Winword document 35. For example, the

macro 36a contains an image datafile 37a. The macro 36b contains a line diagram 37b and the macro 37c contains a bar diagram 37c. In the event 38, the macros 36a, 36b and 36c can be optionally selected either individually or a plurality of them at once for linking into the Winword document 35. On which pages and at which position within the individual pages of the Winword document 35 the macro or the respective macros are to be placed is also indicated in this event. A print data stream 39 is generated therefrom, whereby the individual pages 39a, 39b and 39c are provided with the respective reference index macro data M1, M2, **and** M3.

These information (reference index data M1, M2, **and** M3) are converted into the PCL language and are sent to the printer device 7. Simultaneously, the complete macro information (particularly graphics data) are converted (insofar as they are not already in PCL format) and are transmitted into the printer device 7 separated from the series letter information, i.e. separated from the series print data stream in terms of time and/or in data-oriented fashion, and are deposited in the main memory 8 thereat. A plurality of and, in particular, all complete macro data (graphics information, etc.) required for the print job are thereby stored in the main memory 8. Within the printer device 7, the series letter data (i.e. the series print data stream) are then reunited with the corresponding, complete macro data upon employment of the reference index data M1, M2, **and** M3, i.e. the page 39a is output upon employment of the reference index M1 with the macro 36a (i.e. with the complete print data of the macro 36a), the page 39b is output upon employment of the reference index M2 with the complete data of the macro 36b, and the page 39c is output upon employment of the reference index M3 with the data of the macro 36c. The referencing, i.e. the logical linking between specific document pages (39a,

39b~~,~~ **and** 39c) with the allocated macros 36a, 36b~~,~~ **and** 36c, occurs in the unit 38 in that the reference indices or, respectively, reference index data M1, M2 and M3 are formed.

In the example of Figure 6, the individual document comprises the three pages 39a, 39b~~,~~ **and** 39c. When the document 35 is a series document, then it suffices to make the allocation for an individual document (master document), so that this allocation is valid for all individual documents. The individual documents can thereby be individual pages or -- as shown in Figure 6 -- can comprise a plurality of pages. The advantage of this procedure described for the macro linking is once again that the reoccurring information -- macros here -- need be transmitted only once from the computer 1 to the printer device 7 and can be linked from the main memory in the computer to individual documents as often as desired. Here, too, the quantity of data to be transmitted between computer 1 and printer device 7 is minimal because macros in the individual documents are not transmitted completely but only by indicating their reference index 2 (M1, M2~~,~~ **and** M3).

Figure 7 shows a selection window that is called in the referencing unit 38 in the computer 1. Presets for macros can be undertaken in the window 41, i.e. standardized macro collections and/or links to specific document pages can be deposited. Additional, new macros can be selected for a macro preset via the selection key 42. The position of the macro on specific document pages can be defined in the selection field, for example on all pages, on even-numbered or odd-numbered pages or on specific page numbers. The placement type as **an** overlay ~~(~~**a** complete superimposition) or **a** watermark ~~(~~**the** macro information only in the background) within the document can be selected with the selection field 44.

Figure 8 shows a structure diagram according to which a print event normally sequences within a Windows® operating system running on a computer. What is referred to as a "User-Mode Client" (GDI32.dll) 46 is thereby called proceeding from an application 45, this "User-Mode Client" 46 driving the display device (Graphic Device Interface, GDI). Various printer drivers can thereby be called and the settings of the appertaining printer supported by the respective driver can be set job-specifically. After these settings have been carried out and the print job has been enabled (printing "OK"), a standard check is carried out under Windows to see whether the output format that is thereby generated corresponds to the EMF standard (EMF stands for Enhanced Metafile Format). When this is the case, the print data stream is supplied as **a** EMF data stream to a print processor 49 situated in the spooler 50, being supplied thereto via a spool datafile 48. The data are supplied therefrom to a port monitor 51 and are supplied to the destination printer device 52 as what is referred to as a RAW data stream, i.e. as **a** data stream in a printer language such as, for example, PCL that is matched to the destination printer device. The port monitor 51 thereby controls the output of the data to the output channel (LPT1, LPT2) of the computer allocated to the destination printer device.

When the query 47, however, yields that the document generated in the application 45 is not in EMF format, then what is referred to as a kernel mode 53 is activated wherein a GDI rendering engine (GRE), i.e. the program element "win32k.sys" 54 collaborates with the kernel mini control module 55. A RAW data stream is thereby generated that, as **a** RAW spool datafile 56, is in turn supplied to the print processor 49 in the spooler 50. From there, the handover via the port monitor 51 to the output device 52 in turn ensues as **a** RAW data stream.

How the aspects of the invention described in conjunction with Figures 6 and 7 are implemented within a Windows environment becomes clear in Figure 9. As a result of the invention, the referencing of various documents (~~maser~~**a master** document, macro, **and an** overlay) in such a Windows® environment is controlled via data that are input via a user interface or, respectively, via an input module 59. The referencing ensues within a converter unit 58 that converts a windows-specific Enhanced Metafile data stream (EMF data stream) into a PCL print data stream (RAW data stream of the destination printer).

The processing of a data output (printing) proceeding from the application 45 (for example, Word) initially ensues according to Figure 9 exactly as in the standard Windows® environment according to Figure 8. However, an inventively modified driver is employed as **the** printer driver in Figure 9, this generating a data stream in the EMF format, as a result whereof a spool file 48 is directly generated under Windows or, respectively, via the query 47, and the spool file is supplied to an inventively adapted print processor 56 in the Windows spooler 50. The kernel mode 43 or, respectively, the modules GRE 54 and kernel mini 55 called therein are not supported by the driver, this being indicated by the cross 57 in Figure 9.

Another inventive adaptation is comprised in the print processor 56 that is located in the spooler 50. In contrast to the standard Windows environment of Figure 8, this "Enhanced Print Environment (EPE) Print Processor" 56 does not forward the EMF data directly to the port monitor 51 but calls the converter unit 58, wherein the EMF data stream is converted into a PCL print data stream. The conversion is thereby controlled by the parameters that were previously input via the input module 59 (OPS PCL user interface). Among other things, the input module

59 effects the display of the macro window 40 shown in Figure 7 for this purpose. The output can also ensue into various channels via settings that are either controlled via the input module 59 or, too, directly via the printer driver, which collaborates with the GDI user mode client 46. The output of these PCL-RAW print data can thereby ensue either into an output datafile (channel 1) that, for example, is stored on **the** hard disk or directly to an SCSI-capable printer (channel 2) or back again into the spooler 50 to the port monitor 51 and from the latter via a standard interface (channel 3) to a destination printer device 52.

Exemplary embodiments of the invention have been described. It is thereby clear that, instead of the described Winword application program, other applications, presentation programs, table calculation programs, image processing programs beside text processing programs or other programs standard in the computer field can effectively use the invention. Instead of the PCL printer language that has been described, of course, other printer languages can also be employed, for example PostScript, AFPDS, IPDS, PDF or LCDS, particularly when a completely packed data stream is present that is not resolved into individual constituents such as scripts, forms, etc.

The invention has created an intelligent printer driver or, respectively, an intelligent pre-stage for printing with which the data stream between an application computer and a printer device can be significantly reduced. As a result thereof, a higher document throughput can be achieved in the output. The invention can be applied both in a single-location system wherein a computer is connected to a printer as well as in a network system wherein a plurality of computers send print data to one or more printer devices. Instead of transmitting the data directly to the

printer device, they can be sent from the printing system in which the data are generated to the printer via a print server. Such a system is described, for example, in Druckerbuch, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Poing, Edition 3c (May 1998), ISBN 3-00-001019-X, pages 12-1 through 12-8. This description as well as the corresponding English-language description in The World of Printers, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Edition 3a (November 1998), ISBN 3-00-001081-5, pages 12-1 through 12-8, are herewith likewise incorporated by reference into the present specification.

When the inventive separation between variable data and static data already ensues in the source format of the application (for example, directly in the editor), then it is possible to further automate or, respectively, accelerate the output of data streams in that the static part is further-processed separately from the variable part, for example by conversion of the static part into a macro datafile (for example, in PCL), transmission to the output device, storing thereat and loading the macro in the print generator as needed. The filtering of the data stream can be eliminated by means of this further automation step.

The invention is particularly suited for use in Windows systems and in windows-like systems such as Linux or Macintosh operating systems that at least partly comprise identical ~~or/or [sic]~~ **or** similar ~~similar [sic]~~ systems components as Windows.

The invention can appear in the greatest variety of embodiments, for example as **a** computer datafile, as **a** program module, as **a** program element, as **a** program library or as **a** collection of a plurality of individual datafiles. This embodiment of the invention, which is particularly contained in computer program products such as a

memory element, a diskette, a disk storage, a CD-ROM, a programmable electronic module (ROM, PROM, EPROM), can also be spread via data networks, for example as datafile attachment of an e-mail as well as via the Internet.

~~List of Reference Characters~~

~~1 computer~~

~~2 CPU~~

~~3 monitor~~

~~4 keyboard~~

~~5 main memory~~

~~6 hard disk~~

~~7 printer~~

~~8 printer memory~~

~~9 interface~~

~~10 Winword® application~~

~~11 variable data~~

~~12 static data~~

~~13 enhanced metafile~~

~~14 filtering~~

~~15 filtered, variable data~~

~~16 filtered, static data~~

~~17 data printed out~~

~~18 PCL converter~~

~~19 bitmap memory~~

~~20 input window for print output~~

~~21 mode selection window~~

~~22 window for indicating the scope of the master document~~

~~23 window for indicating the marking property (color)~~

~~24 optimum window for indicating the print output color~~

~~25 master document~~

~~26 static data~~

~~27 title wildcard~~

~~28 name wildcard~~

~~29 competency wildcard~~

~~30 variable data~~

~~31 series letter data stream~~

~~32 first series letter document~~

~~33 static data of the first series letter document~~

~~34 second series letter document~~

~~35 Winword document~~

~~36 macro~~

~~37 external datafile~~

~~38 referencing unit~~

~~39 referenced page stream~~

~~40 macro window~~

~~41 macro preset field~~

~~42 selection field~~

~~43 macro position field~~

~~44 placement selection field~~

~~45 application program~~

~~46 user control module~~

~~47 query~~

~~48 EMF spool datafile~~

~~49 print processor in the spooler~~

~~50 spooler~~

~~51 port monitor~~

~~52 printer device~~

~~53 kernel mode~~

~~54 GRE control module~~

~~55 kernel mini control module~~

~~56 enhanced print environment processor~~

~~57 blocking of the kernel mode~~

~~58 converter unit~~

~~59 input module~~

~~60 output datafile~~

~~61 SCSI printer~~ **Although other modifications and changes may be suggested by those skilled in the art, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.**

METHOD, COMPUTER PROGRAM PRODUCT AND SYSTEM FOR THE TRANSMISSION OF COMPUTER DATA TO AN OUTPUT DEVICE

The invention is directed to a method, a computer program product and a system or, respectively, an apparatus for the transmission of data from a computer system to an output device, particularly print data to a printer device.

A printer device is connected to many computer systems. Different print data format have thereby established themselves dependent on the system environment. For example, the PCL® and PostScript® print data formats are standard in the Windows® environment. Given these print data formats, the data (documents) to be output are sent to the printer completely packed.

In contrast to the PCL® and PostScript® formats that have just been described, print data can be separated into resources (scripts, forms, layouts, etc.) and variable data given other print data formats such as AFPDS (Advanced Function Presentation Data Stream) or IPDS (Intelligent Print Data Stream). The resources and the variable data are thereby merged in relatively late processing steps, i.e. only shortly before the printing. EP-A-0 131 966 discloses a corresponding printing system that receives a print job containing a plurality of documents from a host computer, whereby form data and variable data of a document are transmitted separately from one another. The form data, as well as data that occur multiply in a plurality of documents, are transmitted only once per print job, are stored in the printing system and are employed for printing a plurality of individual documents. The variable data, in contrast, are transmitted once per document.

Computers in a typical office environment (office domain) are frequently equipped with a Windows® operating system or similar operating system such as Linux® and Macintosh®. The PCL® and PostScript® print data languages are standard in this office domain, i.e. given relatively low printing outputs up to approximately 40 pages per minute. In contrast, the AFPDS (Advanced Function Presentation Data Stream) and IPDS (Intelligent Printer Data Stream) data streams are standard in the high-performance printing field above 40 pages per minute.

Specific properties of the data output given windows-like operating systems as well as their application programs such as, for example, the program Word for Windows®, the print languages such as PCL® or PostScript® allocated to them, become especially clear given printout of series documents, i.e. given the use of what is referred to as the mail-merge function. Such series documents are usually composed of individual documents that are composed of static, repeatedly reoccurring data (master, master document) and modifiable/variable data that are introduced into the master or, respectively, into the master document. With reference to the overall document, the variable data in a series document generally only amount to a fraction of the data quantity. The static part thus defines the necessary performance parameters of the system (RAM memory, disk storage, transmission capacity, etc.) in order to achieve a performance-suited printing speed.

Relatively small documents, i.e. individual pages, reports or books (up to approximately 300 pages) can be printed without further ado as packed documents. In contrast thereto, printing series documents in this way can lead to substantial time delays because the static data must be continuously transmitted from the generating computer system to the printer device, i.e. with every individual document.

Another problem given this way of printing is the design of documents with auxiliary information, for example linking images in or the introduction of forms into the documents. These auxiliary information are frequently not produced together with the document to be printed out but often derive from a different data source and are sometimes designed in an involved way in order to be able to be employed for a plurality of applications.

When printing out documents from user programs, for example from Word for Windows®, these auxiliary information are previously generally inserted into the document via an editor (for example, via the Word program). When this document is to be multiply output, particularly as a series document, then there is again the problem that the auxiliary information must be processed given each document, i.e. the data stream repeatedly contains the same information and, thus, redundancy.

There is the same problem when individual forms, banner, header or trailer pages are attached to the document via a Windows printer driver.

An object of the invention is to achieve a high throughput of documents given the output of document data from a computer to an output device.

This object is achieved by the invention recited in the independent claims. Advantageous embodiments of the invention are the subject matter of the subclaims.

The invention is based on the perception that a data stream wherein static and variable data are inseparably connected to one another arises given the output of series documents from Windows® or windows-like applications. The invention has recognized that a separation of these data into static and variable parts -- even when these parts were already previously joined (packed) -- allows the output on a printer device or some other output device to become significantly more efficient and high-performance.

According to a first aspect of the invention, at least one auxiliary document, for example one or more PCL macros, is optionally attached to one or more arbitrary regions (pages) of an existing but arbitrary master document at the beginning of the output, particularly at the beginning of a printout. Particularly given series documents, it is thereby adequate to undertake the allocation only once for the master document. The allocation can then be valid, i.e. activated, for all individual documents. The allocation ensues by means of a logical linking of the two documents, particularly by means of a referencing. Additional parameters can thereby preferably be indicated, for example the position of the second document within the first document. The second document is particularly characterized in that it has a predetermined, non-variable data content (for example, graphics areas or non-variable text components). Within a typical Windows® environment, the referencing is thereby particularly controlled via data that are input via a user interface. The referencing then ensues within a converter unit that converts a windows-specific enhanced metafile data stream (EMF data stream) into a print data stream such as, for example, PCL® or PostScript®.

In advantageous embodiments of the first aspect of the invention, the page region of the master document in which the second document is joined to the master

document is indicated. The integration of the second document can ensue in various modes, for example as overlay or was watermark.

According to a second aspect of the invention, a separation of static and variable data ensues during the output of the data. For example, the variable data are filtered out of the print data stream and further-processed differently than the static data. Whereas the variable data are completely transmitted from the computer to the output device, the static data -- insofar as they repeat -- are transmitted only once from the computer to the output device. As a result thereof, the quantity of data can be considerably reduced and, thus, the performance capability of the printout can be significantly enhanced.

In a system wherein variable and static data are initially connected to one another, a renewed separation of the variable data from the static data ensues in an intermediate step according to this second aspect of the invention before the data are transmitted to the printer device. In order to be able to implement this separation, the variable data are previously provided with a suitable marking; in particular, they are identified chromatically. In particular, the marking already ensues in the production of the document by marking the wildcards at which the variable data are inserted. Preferably, the marking is no longer visible given the output of the data in the printer device.

The inventive separation between variable data and static data can already ensue in the source format of the application (for example, directly in the editor) or in an operation following the application, for example during the course of the conversion of a Windows document into the EMF format or within the EMF format. In particular, the separation can ensue in a following filtering for the EMF conversion and, in particular, given the conversion of the data stream into a print language such as PCL or postscript. The invention makes an intelligent printer driver possible with which extensive print data streams can be transmitted to a printer device at high speed.

According to the second aspect of the invention, a limitation of the static data particularly ensues, i.e. a particular about the scope that the data occupy. As a result of this limitation, a document-exact and location-exact allocation (referencing)

of the variable data to the static data can ensue in a simple way in the following filter operation.

Packed datafiles multiply containing one and the same static data occur not only in PCL and postscript printing data streams but also definitely occur in AFPDS, IPDS and in LCDS data streams. Further, documents/data streams that are generated in a first printer language (for example, in PostScript) can also have data (documents, macro datafiles) that have been generated in other languages (for example, IPDS overlays, IPDS page segments or PCL macros) embedded in them. The invention is therefore suited for the optimum output of any data streams.

What is particularly understood as output device for the invention is a printer device. Nonetheless, the invention can also be employed in conjunction with other output devices by themselves or in combination with a printer device. For example, a print server, a CD-ROM writer device or a print data archive can also serve as output device, as disclosed in the PCT Patent Application PCT/EP98/05460. The content of this application or, respectively, of the publications resulting therefrom are herewith incorporated by reference into the present specification.

Exemplary embodiments of the invention are explained in greater detail below on the basis of some Figures.

Shown are:

Figure 1 a printing system
Figure 2 a data stream in the printing system
Figure 3 a selection mask
Figure 4 a second selection mask
Figure 5 a series document
Figure 6 a second data stream
Figure 7 a further selection mask
Figure 8 a standard Windows system environment and
Figure 9 a modified Windows system environment.

Figure 1 shows a personal computer 1 with a connected printer 7. In a known way, the personal computer 1 contains a central processor unit (CPU) 2, a monitor 3 connected thereto, as well as an input device 4 (keyboard, mouse, touch

screen or the like), a main memory 5 and a hard disk 6. The computer 1 is connected to the printer 7 via the interface 9. The personal computer 1 is operated with an operating system, for example with Microsoft Windows 95® or Windows NT. Various application programs in turn run under this operating system, for example the application 10 Winword 97® from the Microsoft Office 97® package. How variable and static data of a series letter from the Winword application are printed is explained with reference to the example of Figure 2. Variable data 11 and static data 12 that are stored in the main memory 5 and/or on the hard disk 6 are thereby incorporated into the application. For this purpose, the user can produce a master document in the Winword program 10, static data areas and variable data areas being provided in said master document. The variable data areas are intended to be filled with variable data that are stored in a separate datafile (Word document, data bank, Excel document, etc.). Further details about this series letter production are set forth, for example, on pages 75 through 93 in the book by Rainer-Walter Schwabe, Word 97: leicht, klar, sofort, Markt- und Technik-Verlag, Haar (1997), ISBN 3-8272-5267-3. This description is herewith incorporated by reference into the present specification.

Wildcards for the variable data are thereby created in the variable data areas of the Winword master document, for example with the particular <<name>>. When the series letter is called, the variable datum in these wildcards is then taken record-by-record from the field "Name" of the datafile that contains the variable data.

In order to print out the series letter, i.e. the individual documents with the respectively inserted, variable data, the wildcards for the variable data, for example <<name>>, are distinguished from the static data of the master document with a suitable marking. This occurs, for example, by formatting the wildcards in a specific color. The color should thereby be selected such that the printer is not in the position of printing out data in this color. A color is thus employed that lies outside the reproducible color spectrum of the printer. This type of marking can assure that the visual appearance of the document output on the printer 7 is not affected by the marking. The marking can ensue in a known way within the application 10, i.e. with the command "Format|Character" of the application Word for Windows in the present example.

Before a document is printed out from the application, two particulars that control the rest of the printout must be produced. First, what properties the marking of the wildcards for variable data has must be specified. In the present example, this is the marking of the wildcards with the color red (also see Figure 4). Second, the scope of the mater document must be indicated. The individual documents of the series letter can be distinguished or, respectively, separated from one another with this particular in the later filter operation.

For printing out the series letter, the wildcards in the variable data areas of the master document are replaced record-by-record in the application 10 by the corresponding variable data 11 of the variable data memory, and a data stream or, respectively, a datafile of the entire document, i.e. of the static and of the variable data, is generated in the Enhanced Metafile Format (EMF) 13. In this EMF spooling, which is implemented via a Windows printer driver given output of the series letter, each individual document of the series letter or, respectively, of the series document is respectively newly constructed from the master document. In order to avoid a redundant data repetition of the static data, the static part 16 and the variable part 15 of the individual documents from the series letter data stream are respectively separated from one another in the filter operation 14. The variable data are thereby recognized on the basis of their marking that was previously undertaken as described above. In addition to this marking information, the scope of the master document, for example the number of pages it fills, is also needed in this filter operation. As a result thereof, the individual documents can be distinguished from one another in the filter event.

In the filter event 14, the static data are separated from the variable data on the basis of the marking of the variable data and on the basis of the indicated limitation (number of pages of the master document). The static data are transmitted to the printer device 7 and are stored as form or macro thereat in the main memory 8. The capacity of the main memory is thereby fashioned of such a size that a plurality of documents (macros, forms) as well as their appertaining referencing data can be simultaneously stored therein. The main memory, as RAM (Random Access Memory), can thereby typically amount, for example, to 4, 8, 64, 128, 512 or even

more megabytes (MB) or can also be fashioned as hard disk with memory capacities of a number of gigabytes that are typical thereof. A combination of the two memory types (RAM, hard disk) can also be meaningful, whereby documents (macros, etc.) of a print job that are called more often are stored in the RAM and documents that are called less often, for example documents (macros) of the print job that are called only once, are stored on the hard disk.

The variable data, in contrast, together with all needed characteristics (for example, indications of position on the individual document, color particulars, font particulars) are separately transmitted, likewise to the printer device. The transmission of the variable data and of the static data from the computer system 1 to the printer device 7 can ensue via the same data line, whereby, however, a logical discrimination (separability) between the data must be retained.

Beginning with the second individual document, only the filtered, variable data are then transmitted to the printer device 7, as a result whereof a considerable reduction of the data stream between computer system 1 and printer system 7 is achieved.

Within the printer device 7, the received, variable data are mixed again with the static data and printed in common on a recording medium (paper, labels, films, etc.).

In the second and in all further individual documents, the static data 16 are discarded in the computer 1 or, respectively, within the PCL converter 18 and are not transmitted to the printer device 7. In contrast, the variable data 15 together with their characteristic particulars are transmitted to the printer device individual document by individual document. In the printer device 7, these variable data 15 are then merged by an OR-operation with the static data stored in the memory 8.

The filter event 14 precedes the conversion of the data into a PCL data stream. However, it occurs within the PCL converter 18.

A postscript converter or some arbitrary other converter that is standard in the respective system environment can also be employed instead of a PCL converter. The filter event 14 can also be directly applied onto the EMF intermediate datafile or, respectively, the EMF intermediate data stream 13 or can be applied to the source text

of the editor (for example, in Word). The filtered, variable data 15 or, respectively, static data 16 then already enter in the PCL converter.

Figure 3 shows a selection window that is selected before the printing event from the application ensues into the EMF intermediate datafile (event 13). The input window 20 contains a first selection window 21 in which two print modes can be selected. In the first print mode (standard), print data from the windows application are printed out in a standard way, i.e. the filter procedure (event 14) does not occur. Series letters are then transmitted to the printer device 7 individual document by individual document. The above-described filter procedure (event 14) isn activated by selecting the option "extended mail processing" in the mode window 21.

The scope of the master document can be specified in the selection window 22. As a result thereof, the separation of the individual document pages is enabled in the filter event.

The color property with which the wildcards of variable data were marked in the master document is indicated in the selection window 23. Figure [...] shows various selection fields (black/gray, red, green, blue) for these markings.

Whether the dynamic texts are to be printed differently in the printer device 7, for example in a highlight color, can be optionally indicated in the selection window. This assumes that the printer device is in the position to print in two colors, whereby the standard texts are printed in the first color and the dynamic texts are printed in the second color. The first color, for example, is thereby black and the second color is blue (highlight color) or vice versa.

In a further embodiment of the invention, the dynamic texts can be marked either [sic] in a first color that cannot be presented by the printer. The variable data marked in this way are printed out in the same color as the static data. Other variable data, in contrast, are marked in a second color and printed out in the second ink (highlight color) of the printer device. The possibility of indicating different output colors is thus created, even given dynamic data.

Figure 5 shows a master document 25. It is composed of static data 26 and of the three variable wildcards 27, 28 and 29 (title, name, competency). The

length of the master document amounts to one page. Variable data are stored in the datafile 30 in the fields name, competency and title. The master document 25 and the variable data 30 are combined into the series document 31, whereby the static text part 33 that corresponds to the static data 16 (Figure 2) is extracted from the first series document 32. These data are employed for generating the second individual document 33 (see Figure 2).

Figure 6 shows how an auxiliary information can be linked into an existing document. As indicated in the preceding examples or, respectively, Figures, let the application here also be the program Winword. A macro 36 that contains an external data source 37 is linked into the Winword document 35. For example, the macro 36a contains an image datafile 37a. The macro 36b contains a line diagram 37b and the macro 37c contains a bar diagram 37c. In the event 38, the macros 36a, 36b and 36c can be optionally selected either individually or a plurality of them at once for linking into the Winword document 35. On which pages and at which position within the individual pages of the Winword document 35 the macro or the respective macros are to be placed is also indicated in this event. A print data stream 39 is generated therefrom, whereby the individual pages 39a, 39b and 39c are provided with the respective reference index macro data M1, M2, M3.

These information (reference index data M1, M2, M3) are converted into the PCL language and are sent to the printer device 7. Simultaneously, the complete macro information (particularly graphics data) are converted (insofar as they are not already in PCL format) and are transmitted into the printer device 7 separated from the series letter information, i.e. separated from the series print data stream in terms of time and/or in data-oriented fashion, and are deposited in the main memory 8 thereat. A plurality of and, in particular, all complete macro data (graphics information, etc.) required for the print job are thereby stored in the main memory 8. Within the printer device 7, the series letter data (i.e. the series print data stream) are then reunited with the corresponding, complete macro data upon employment of the reference index data M1, M2, M3, i.e. the page 39a is output upon employment of the reference index M1 with the macro 36a (i.e. with the complete print data of the macro 36a), the page 39b is output upon employment of the reference index M2 with the complete data of the

macro 36b, and the page 39c is output upon employment of the reference index M3 with the data of the macro 36c. The referencing, i.e. the logical linking between specific document pages (39a, 39b, 39c) with the allocated macros 36a, 36b, 36c, occurs in the unit 38 in that the reference indices or, respectively, reference index data M1, M2 and M3 are formed.

In the example of Figure 6, the individual document comprises the three pages 39a, 39b, 39c. When the document 35 is a series document, then it suffices to make the allocation for an individual document (master document), so that this allocation is valid for all individual documents. The individual documents can thereby be individual pages or -- as shown in Figure 6 -- can comprise a plurality of pages. The advantage of this procedure described for the macro linking is once again that the reoccurring information -- macros here -- need be transmitted only once from the computer 1 to the printer device 7 and can be linked from the main memory in the computer to individual documents as often as desired. Here, too, the quantity of data to be transmitted between computer 1 and printer device 7 is minimal because macros in the individual documents are not transmitted completely but only by indicating their reference index 2 (M1, M2, M3).

Figure 7 shows a selection window that is called in the referencing unit 38 in the computer 1. Presets for macros can be undertaken in the window 41, i.e. standardized macro collections and/or links to specific document pages can be deposited. Additional, new macros can be selected for a macro preset via the selection key 42. The position of the macro on specific document pages can be defined in the selection field, for example on all pages, on even-numbered or odd-numbered pages or on specific page numbers. The placement type as overlay (complete superimposition) or watermark (macro information only in the background) within the document can be selected with the selection field 44.

Figure 8 shows a structure diagram according to which a print event normally sequences within a Windows® operating system running on a computer. What is referred to as a "User-Mode Client" (GDI32.dll) 46 is thereby called proceeding from an application 45, this "User-Mode Client" 46 driving the display device (Graphic Device Interface, GDI). Various printer drivers can thereby be called

and the settings of the appertaining printer supported by the respective driver can be set job-specifically. After these settings have been carried out and the print job has been enabled (printing "OK"), a standard check is carried out under Windows to see whether the output format that is thereby generated corresponds to the EMF standard (EMF stands for Enhanced Metafile Format). When this is the case, the print data stream is supplied as EMF data stream to a print processor 49 situated in the spooler 50, being supplied thereto via a spool datafile 48. The data are supplied therefrom to a port monitor 51 and are supplied to the destination printer device 52 as what is referred to as a RAW data stream, i.e. as data stream in a printer language such as, for example, PCL that is matched to the destination printer device. The port monitor 51 thereby controls the output of the data to the output channel (LPT1, LPT2) of the computer allocated to the destination printer device.

When the query 47, however, yields that the document generated in the application 45 is not in EMF format, then what is referred to as a kernel mode 53 is activated wherein a GDI rendering engine (GRE), i.e. the program element "win32k.sys" 54 collaborates with the kernel mini control module 55. A RAW data stream is thereby generated that, as RAW spool datafile 56, is in turn supplied to the print processor 49 in the spooler 50. From there, the handover via the port monitor 51 to the output device 52 in turn ensues as RAW data stream.

How the aspects of the invention described in conjunction with Figures 6 and 7 are implemented within a Windows environment becomes clear in Figure 9. As a result of the invention, the referencing of various documents (maser document, macro, overlay) in such a Windows® environment is controlled via data that are input via a user interface or, respectively, via an input module 59. The referencing ensues within a converter unit 58 that converts a windows-specific Enhanced Metafile data stream (EMF data stream) into a PCL print data stream (RAW data stream of the destination printer).

The processing of a data output (printing) proceeding from the application 45 (for example, Word) initially ensues according to Figure 9 exactly as in the standard Windows® environment according to Figure 8. However, an inventively modified driver is employed as printer driver in Figure 9, this generating a data stream

in the EMF format, as a result whereof a spool file 48 is directly generated under Windows or, respectively, via the query 47, and the spool file is supplied to an inventively adapted print processor 56 in the Windows spooler 50. The kernel mode 43 or, respectively, the modules GRE 54 and kernel mini 55 called therein are not supported by the driver, this being indicated by the cross 57 in Figure 9.

Another inventive adaptation is comprised in the print processor 56 that is located in the spooler 50. In contrast to the standard Windows environment of Figure 8, this "Enhanced Print Environment (EPE) Print Processor" 56 does not forward the EMF data directly to the port monitor 51 but calls the converter unit 58, wherein the EMF data stream is converted into a PCL print data stream. The conversion is thereby controlled by the parameters that were previously input via the input module 59 (OPS PCL user interface). Among other things, the input module 59 effects the display of the macro window 40 shown in Figure 7 for this purpose. The output can also ensue into various channels via settings that are either controlled via the input module 59 or, too, directly via the printer driver, which collaborates with the GDI user mode client 46. The output of these PCL-RAW print data can thereby ensue either into an output datafile (channel 1) that, for example, is stored on hard disk or directly to an SCSI-capable printer (channel 2) or back again into the spooler 50 to the port monitor 51 and from the latter via a standard interface (channel 3) to a destination printer device 52.

Exemplary embodiments of the invention have been described. It is thereby clear that, instead of the described Winword application program, other applications, presentation programs, table calculation programs, image processing programs beside text processing programs or other programs standard in the computer field can effectively use the invention. Instead of the PCL printer language that has been described, of course, other printer languages can also be employed, for example PostScript, AFPDS, IPDS, PDF or LCDS, particularly when a completely packed data stream is present that is not resolved into individual constituents such as scripts, forms, etc.

The invention has created an intelligent printer driver or, respectively, an intelligent pre-stage for printing with which the data stream between an application

computer and a printer device can be significantly reduced. As a result thereof, a higher document throughput can be achieved in the output. The invention can be applied both in a single-location system wherein a computer is connected to a printer as well as in a network system wherein a plurality of computers send print data to one or more printer devices. Instead of transmitting the data directly to the printer device, they can be sent from the printing system in which the data are generated to the printer via a print server. Such a system is described, for example, in Druckerbuch, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Poing, Edition 3c (May 1998), ISBN 3-00-001019-X, pages 12-1 through 12-8. This description as well as the corresponding English-language description in The World of Printers, edited by Dr. Gerd Goldmann, Océ Printing Systems GmbH, Edition 3a (November 1998), ISBN 3-00-001081-5, pages 12-1 through 12-8, are herewith likewise incorporated by reference into the present specification.

When the inventive separation between variable data and static data already ensues in the source format of the application (for example, directly in the editor), then it is possible to further automate or, respectively, accelerate the output of data streams in that the static part is further-processed separately from the variable part, for example by conversion of the static part into a macro datafile (for example, in PCL), transmission to the output device, storing thereat and loading the macro in the print generator as needed. The filtering of the data stream can be eliminated by means of this further automation step.

The invention is particularly suited for use in Windows systems and in windows-like systems such as Linux or Macintosh operating systems that at least partly comprise identical or/or [sic] similar similar [sic] systems components as Windows.

The invention can appear in the greatest variety of embodiments, for example as computer datafile, as program module, as program element, as program library or as collection of a plurality of individual datafiles. This embodiment of the invention, which is particularly contained in computer program products such as a memory element, a diskette, a disk storage, a CD-ROM, a programmable electronic

module (ROM, PROM, EPROM), can also be spread via data networks, for example as datafile attachment of an e-mail as well as via the Internet.

List of Reference Characters

1	computer
2	CPU
3	monitor
4	keyboard
5	main memory
6	hard disk
7	printer
8	printer memory
9	interface
10	Winword® application
11	variable data
12	static data
13	enhanced metafile
14	filtering
15	filtered, variable data
16	filtered, static data
17	data printed out
18	PCL converter
19	bitmap memory
20	input window for print output
21	mode selection window
22	window for indicating the scope of the master document
23	window for indicating the marking property (color)
24	optimum window for indicating the print output color
25	master document
26	static data
27	title wildcard
28	name wildcard
29	competency wildcard
30	variable data

31	series letter data stream
32	first series letter document
33	static data of the first series letter document
34	second series letter document
35	Winword document
36	macro
37	external datafile
38	referencing unit
39	referenced page stream
40	macro window
41	macro preset field
42	selection field
43	macro position field
44	placement selection field
45	application program
46	user control module
47	query
48	EMF spool datafile
49	print processor in the spooler
50	spooler
51	port monitor
52	printer device
53	kernel mode
54	GRE control module
55	kernel mini control module
56	enhanced print environment processor
57	blocking of the kernel mode
58	converter unit
59	input module
60	output datafile
61	SCSI printer

Patent Claims

1. Method for the transmission of data from a computer system (1) that is operated with a Windows ir windows-like operating system to an output device, whereby

(a) a master document (25, 35) is generated;

(b) a plurality of auxiliary documents (macros, 36a, 36b, 36c) are logically linked with the master document (35) by forming reference indices (M1, M2, M3);

(c) the data of the auxiliary documents (macros, 36a, 36b, 36c) are sent to the output device (7) separated from the data of the master document (25, 35); and

(d) the data of the auxiliary documents (macro, 36a, 36b, 36c) are joined with the data of the master document (25, 35) in the output device (7) upon employment of the reference indices (M1, M2, M3), whereby

(d) [sic] a print job is generated such from an application program that

(d1) a printer driver is first called,

(d2) the settings of the appertaining printer supported by the called printer driver are then set job-specifically,

(d3) the print job is then enabled, as a result whereof the data of the master document (25, 35) and/or of the auxiliary documents (macro, 36a, 36b, 36c) are generated,

(d4) a check is then carried out in a check step (47) to see whether the respectively generated output format corresponds to a standard (EMF) prescribed by the operating system (Windows),

(d5) the data, when there is correspondence, are supplied to a print processor (49) located in a spooler (50) and, when non-correspondence is found in the check step (49), are converted by an operating system-specific converter unit (GDF) into an intermediate data stream (RAW) that can be further-processed via various output channels (output datafile, channel 1; SCSI-capable printer, channel 2; standard interface, channel 3).

2. Method according to claim 1, whereby the data of the auxiliary documents (36a, 36b, 36c) are stored in the output device (7).

3. Method according to one of the preceding claims, whereby the data of the master document (25, 35) are joined with the data of the auxiliary documents (36a, 36b, 36c) for the output of individual documents (33, 39a, 39b, 39c)

4. Method according to one of the preceding claims, whereby the auxiliary documents (macro, 36a, 36b, 36c) are respectively attached to one or more arbitrary regions (pages) of the first document (master document, 35) at the beginning of the output.

5. Method according to one of the preceding claims, whereby the referencing in a windows systems environment or in a windows-like system environment (Linux, Macintosh) is controlled via data that are input via a user interface.

6. Method according to claim 5, whereby the referencing ensues in a converter unit (58) that converts an enhanced metafile data stream (EMF datastream) into a print data stream of a printer language (PCL, PostScript, LCDS).

7. Method according to claim 5, whereby the converter unit (58) collaborates with a print processor (56) and a port monitor (51) of a spooler (50).

8. Method according to one of the preceding claims, whereby the area of the master document (25, 35), particularly the page region, wherein a respective

auxiliary document (macro, 36a, 36b, 36c) is to be linked with the master document (25, 35) can be specified.

9. Method according to one of the preceding claims, whereby whether an auxiliary document (macro, 36a, 36b, 36c) is an overlay or a watermark document is indicated.

10. Method according to one of the preceding claims, whereby an auxiliary document (macro, 36a, 36b, 36c) is a macro datafile.

11. Method according to one of the preceding claims, whereby a printer device is employed as output device (7).

12. Method according to one of the preceding claims, whereby an auxiliary document (macro, 36a, 36b, 36c) is transmitted to the output device (7) in the PCL print data language.

13. Method according to one of the claims 1 through 11, whereby an auxiliary document (macro, 36a, 36b, 36c) is transmitted to the output device (7) in the PostScript print data language.

14. Method according to one of the claims 1 through 11, whereby an auxiliary document (macro, 36a, 36b, 36c) is transmitted to the output device (7) in the IPDS print data language.

15. Method according to one of the claims 1 through 11, whereby an auxiliary document (macro, 36a, 36b, 36c) is transmitted to the output device (7) in the LCDS print data language.

16. Method according to one of the preceding claims, whereby an auxiliary document (macro, 36a, 36b, 36c) contains graphics information, particularly an image datafile (37a) or a diagram (37b, 37c)

17. Method according to one of the preceding claims, whereby

(a) the master document (25, 35) comprises a variable data area (27, 28, 29) and a static data area (12, 26);

(b) the variable data area (27, 28, 29) is marked;

(c) variable data (11) are inserted into the variable data area (27, 28, 29), as a result whereof a serial data stream (31) with individual documents (32, 34) arises;

(d) the variable data (11, 30) from the serial data stream (31) are separated from the static data (12, 33) on the basis of the marking;

(e) the variable data (11, 30) separated from the static data (12, 33) from the first individual document are transmitted to the output device (7);

(f) the static data (12, 33) of the first individual document (32) are stored in the output device (7);

(g) the static data (12, 33) of the following individual documents are not transmitted to the output device (7); and

(h) the variable data (11, 30) are in turn joined with the stored, static data (12, 33) individual document by individual document in the output device (7).

18. Method according to claim 17, whereby the marking of the variable data region (27, 28, 29) ensues by means of a visually perceptible identification.

19. Method according to claim 18, whereby the marking ensues chromatically.

20.Computer program product comprising elements for the implementation of the method according to one of the preceding claims.

21. System for the implementation of a method according to one of the preceding claims that comprises at least one computer.

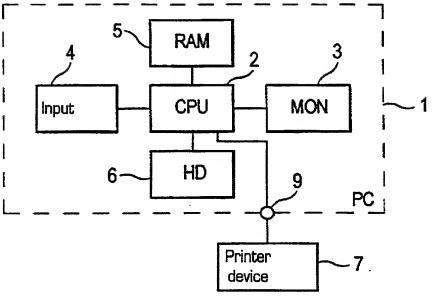

Fig.1

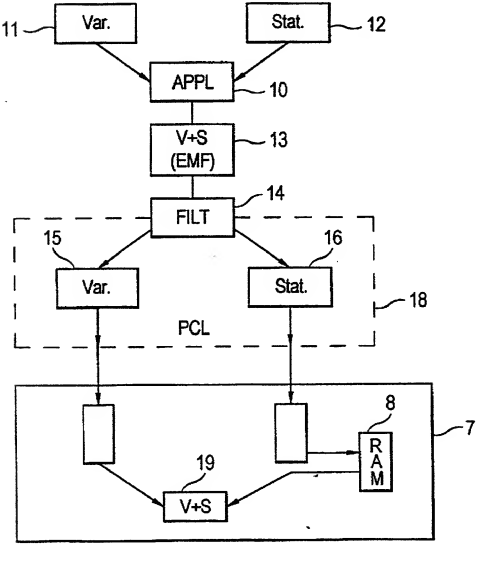

Fig.2

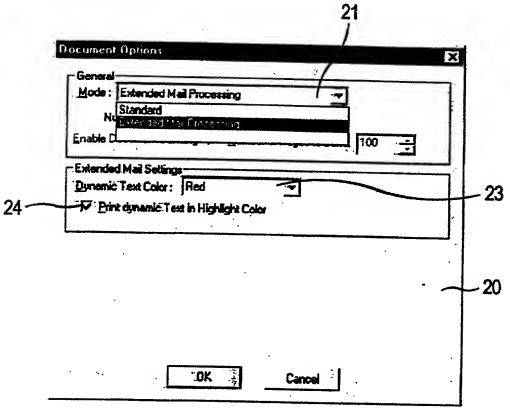

Fig.3

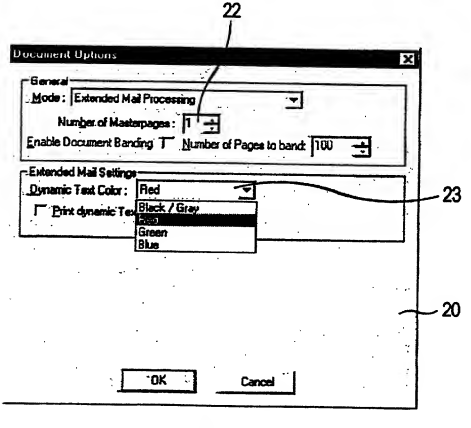

Fig.4

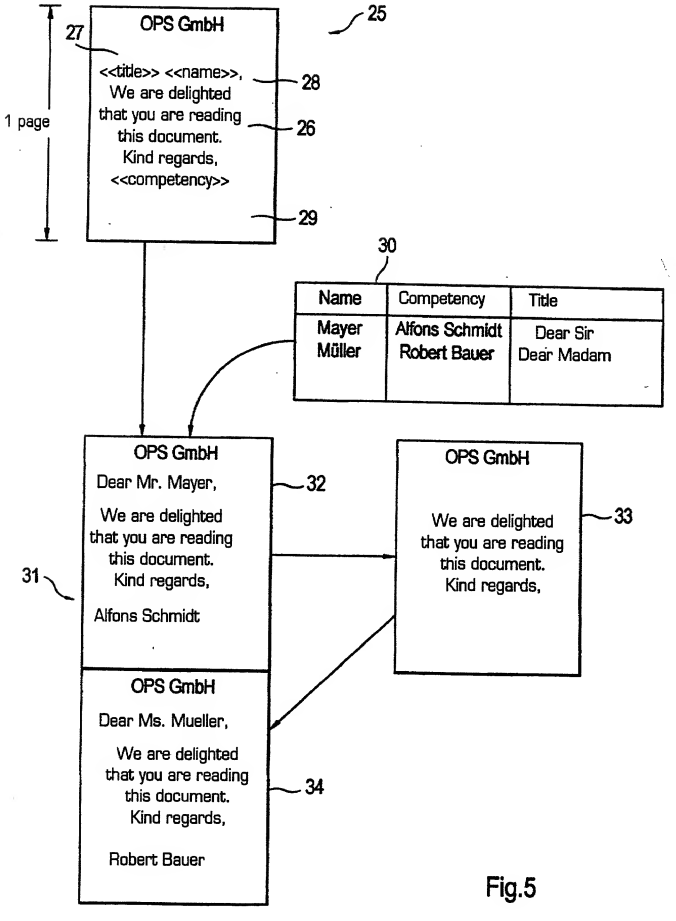

Fig.5

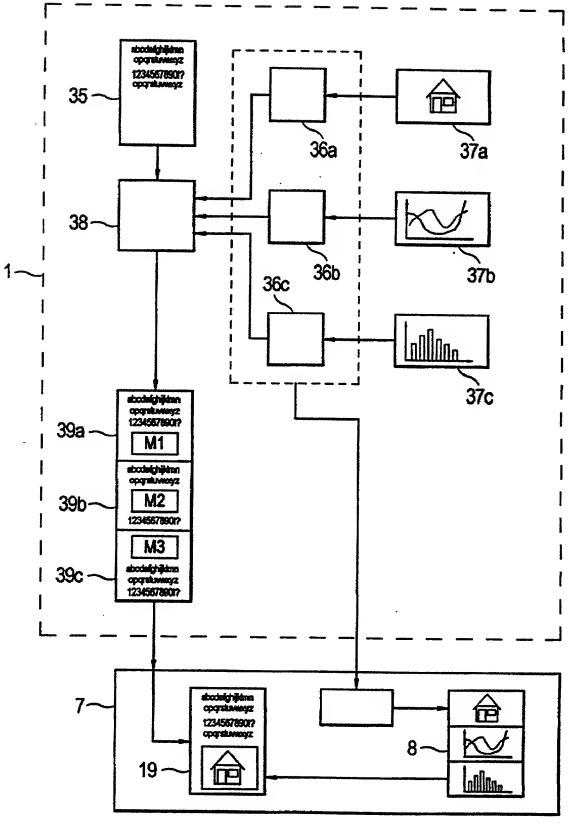

Fig.6

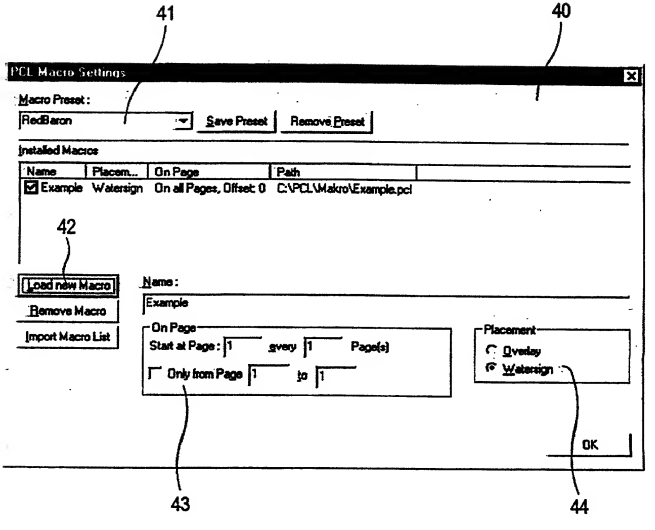
41
40
PCL Macro Settings
Macro Preset :
RedBaron
Save Preset
Remove Preset
Installed Macros
Name
Placem...
On Page
Path
Example
Watersign
On all Pages, Offset: 0
C:\PCL\Makro\Example.pcl
42
Load new Macro
Remove Macro
Import Macro List
Name :
Example
On Page
Start at Page : 1
every 1
Page(s)
Only from Page 1
to 1
Placement
Overlay
Watersign
OK
43
44

Fig.7

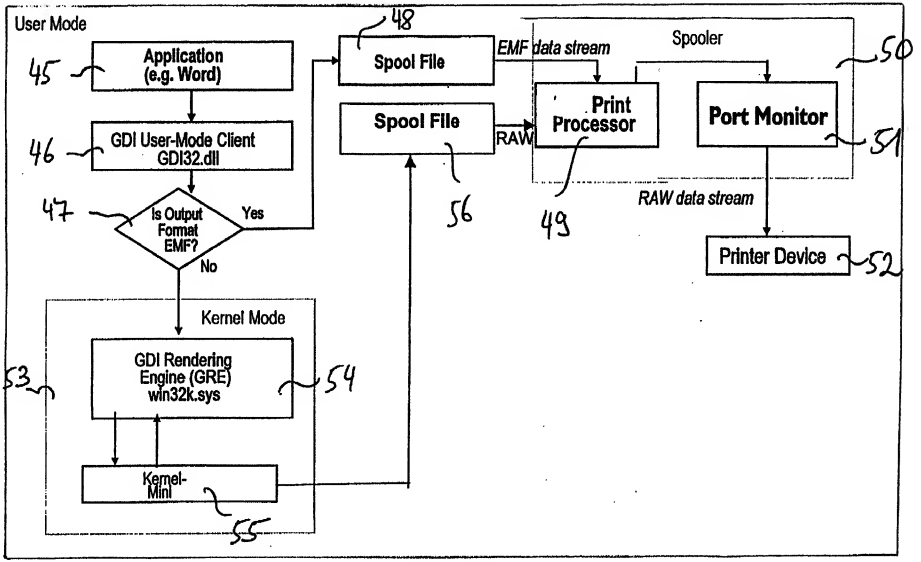

Fig. 8

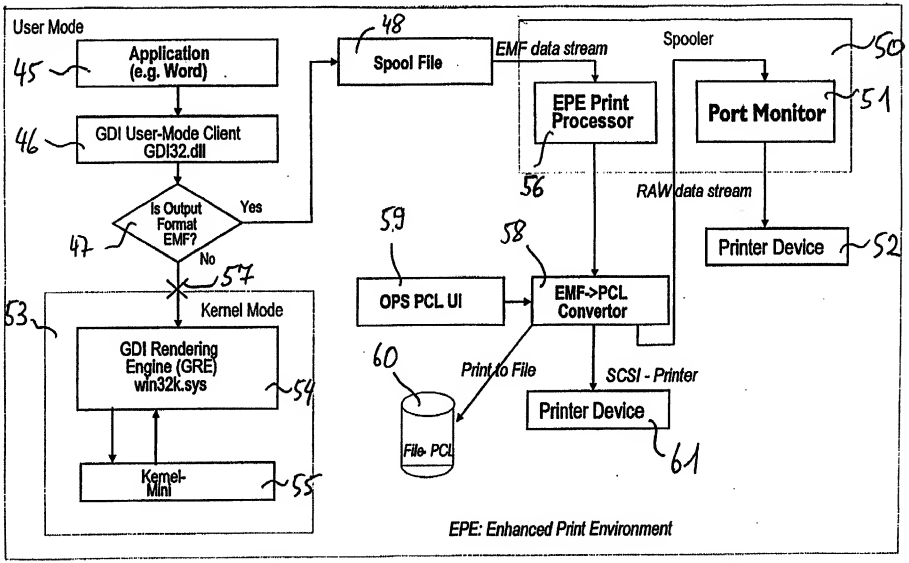

Fig. 9

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION
ERKLÄRUNG FÜR PATENTANMELDUNGEN MIT VOLLMACHT
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für des dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

VERFAHREN, COMPUTERPROGRAMMPRODUKT UND SYSTEM ZUR ÜBERTRAGUNG VON COMPUTER-DATEN AN EIN AUSGABEGERÄT

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigefügt ist.

■ am 15 March 2000 als
PCT internationale Anmeldung
PCT Anmeldungsnummer PCT/EP00/02311
eingereicht wurde und am _____
abgeändert wurde (falls tatsächlich abgeändert)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

_____

_____

the specification of which

(check one)

☐ is attached hereto

☐ was filed on _____ as
PCT international application
PCT Application No. _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

			Priority Claimed	
199 11 462.5	Germany	15 March 1999	■ Yes Ja	□ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)		
			□ Yes Ja	□ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)		

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122 I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint all Attorneys identified by United States Patent and Trademark Office Customer number 26574, who are all members of the firm of Schiff Hardin and Waite.

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Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address
Voller Name des vierten Miterfinders (falls zutreffend):	Full name of fourth joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
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